Characterising Parkinson's disease in the interRAI-Home Care Assessment

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A thesis submitted in partial fulfilment of the requirements for the Degree of Master of Science in Psychology

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Christchurch, New Zealand

2018

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List of Abbreviations

AD	Alzheimer's disease
ADAS-Cog	Alzheimer's disease Assessment Scale –Cognitive Subscale
ADL-IS	Alzheimer's disease Activities of Daily Living –International Scale
ADL –Long Form	Activities of Daily Living –Long Form
CAPs	Clinical Assessment Protocols
CDHB	Canterbury District Health Board
CPS	Cognitive Performance Scale
CVLT	California Verbal Learning Test
DKEFS	Delis-Kaplan Executive Function System
DLB	Lewy Body dementia
DRS-2	Dementia Rating Scale-2
GDS	Geriatric Depression Scale
HADS	Hospital Anxiety and Depression Scale
H&Y	Hoehn & Yahr
IADL-Capacity	Instrumental Activities of Daily Living –Capacity Scale
IADL-Performance	Instrumental Activities of Daily Living –Performance Scale
interRAI-HC	interRAI- Home Care assessment (version 9.1 NZ customisation)
JLO	Judgement of Line Orientation
Md	Median
MDS	Movement Disorder Society
MDS-HC	interRAI –Home Care assessment (version 2.0)
MMSE	Mini Mental Status Examination
MoCA	Montreal Cognitive Assessment
NHI	National Health Index Number
NPI	Neuropsychiatric Inventory
NZBRI	New Zealand Brain Research Institute
NZGG	New Zealand Guidelines Group
PDD	Parkinson's disease – Dementia onset
PDMCI	Parkinson's disease – Mild Cognitive Impairment
PDN	Parkinson's disease – Normative cognitive functioning
Q_1	Lower Quartile/First Quartile -25th percentile of the interquartile range
Q_3	Upper Quartile/Third Quartile -75th percentile of the interquartile range
RCFT	Rey Complex Figure Test and Recognition Trial
TEA	Test of Everyday Attention
UPDRS	United Parkinson's disease Rating Scale
VOSP	Visual Object and Space Perception Battery
WAIS-IV	Wechsler Adult Intelligence Scale –Fourth Edition

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Acknowledgements

This project has been long journey, with several disruptions and ups and downs. Successful completion will coincide with the end of a long period of illness for me, and also celebrate all the wonderful supports I have in my life. I am very lucky.

Firstly, I would like to thank my primary supervisor Professor John Dalrymple-Alford, not only for his guidance and academic insight, but for his continual support and understanding when I was particularly unwell. I would also like to thank my secondary supervisor Professor Philip Schluter, for his sharp mind and attention to detail, and also for his patience and assurance at times when I felt like this project was on top of me. I would also like to thank Tim Anderson, Michael MacAskill and Hamish Jamieson for their input, particularly in the early stages of this project and for welcoming me into the team at NZBRI.

To all of the team at NZBRI, Thank you! I have at many times been the absent member in the office, but I always felt the support of the group keeping me afloat. Thank you to Leslie Livingston for welcoming me into the study, to Kyla Horne for tutoring me through neuropsychological testing and to Sophie McGinigal for teaching me the ropes and taking my ongoing questions. I would also like to thank Dr Amy Wang, whose initial support and guidance turned into a treasured friendship.

I owe so much of my study to the support and understanding of my friends and family. In particular I would like to thank Alexandra MacLeod, for her daily collaboration and encouragement; to Aimee Tang, for her kindness and affirmation; and to Filip Tončić, for caring for me when I could give him my least. I would also like to thank Susan Rapley for taking my analysis queries and to Olivia Webb for her genuine input and interest.

Lastly, I would like to dedicate this thesis to my late mother, Colleen Lockie. Due to illness she was unable to complete her Master thesis, and at times I questioned whether I would be able to complete myself. As a past member of staff, I am grateful to have contributed to her legacy at the University of Canterbury and completed this milestone on her behalf. Although she was unable to stand beside me while completing this thesis, her remaining wisdom and love will always be unfailing and complete.

Abstract

Parkinson's disease (PD) is a complex neurodegenerative disorder. This research compared the characterisation of cognitive functioning, motor symptoms and non-motor symptoms in PD by the interRAI-Home Care Assessment (interRAI-HC) with a battery of detailed neuropsychological tests. A small sample of 34 participants were classified by cognitive status (PDN= Normative cognition, PDMCI=Mild Cognitive Impairment, PDD=Dementia) using current *Movement Disorder Society* criteria to evaluate whether the interRAI-HC could identify differences of functioning for these groups to reflect the differences of need indicated by research. This comparison also provided preliminary evaluation of the external validity of some corresponding interRAI-HC measures in the assessment of PD. Results of the interRAI-HC saw trends of agreement with neuropsychological testing, however very few measures distinguished significant group differences. The interRAI-HC assessment of falls, instrumental activities of daily living, short-term memory and procedural memory showed convergence with neuropsychological measures. However further research is required to clarify the characterisation of PD by the interRAI-HC, and further validate these measures for this population.

Characterising Parkinson's disease in the interRAI-Home Care Assessment

Parkinson's disease (PD) is a common and complex neurodegenerative disorder, long characterised by motor features of bradykinesia, postural instability, rigid gait and tremor. PD is also increasingly recognised as heterogeneous, with variable early clinical presentations and clinical outcomes (Jankovic, et al., 1990; Noyce, et al, 2012; Postuma, et al, 2012). Recent research shows that clinically significant non-motor symptoms can precede motor symptoms by more than a decade (Kalia and Lang, 2015), have greater impact on quality of life (Antonini, et al., 2012), and are associated with early mortality (Oosterveld, et al., 2015). Cognitive decline and dementia have moved to the forefront of recent PD research, because early cross-sectional studies reporting an average incidence of dementia in Parkinson's disease (PDD) at 30-40% (Emre, et al., 2007) has evolved to an awareness that PDD eventuates in 75-90% of individuals as the disease progresses (Hely, Reid, Adena, Halliday and Morris, 2008). Recently published criteria has characterised cognitive profile in PD to three levels of cognitive status, patients with normal cognition (PDN), mild cognitive impairment (PDMCI) and PDD (Emre et al., 2007; Litvan, et al., 2012). This increased interest has given focus to the potential transitional phase of PDMCI which exhibits increased risk of progression to dementia (Hoogland, et al., 2017; Wood et al., 2016) and more aggressive motor decline (Louis, et al., 1999). As a result, researchers now recommend routine cognitive assessment in the management of PD to identify patients with a high risk of rapid cognitive decline with important implications for clinical care and intervention (Ambrosio, Narvarta-Sanchez and Portillo, 2014).

Clinical care and intervention for chronic illness is a concern for policy makers worldwide (World Health Organisation, 2011) with PD projected to double in New Zealand in the next 25 years (Myall et al., 2017) largely due to the increasing aging population. Thus assessment of PD patients by an interdisciplinary team of health professionals is important to understand the complexity of need across course, to implement and integrate

multidisciplinary intervention, to provide adequate community support, and to monitor projections of resources in order to meet this need. The interRAI Home Care (interRAI-HC) Assessment System is a validated comprehensive geriatric assessment designed to guide assessment of health needs, and the planning of care and services in community based settings (Morris et al., 2009). The advent of mandatory implementation of the interRAI-HC assessment in New Zealand presents an extraordinary opportunity to evaluate the characterisation of health needs for older people on a national scale and develop projections needed for adequate intervention (Nishtala and Jamieson, 2017). As part of this work, it is important to continue evaluation of how the interRAI-HC identifies the need of older people in the community, and specifically the complex needs of PD.

1.1. Parkinson's disease presentation

Classic symptoms include rigidity and bradykinesia, although rest tremor is often an initial problem that leads to clinical assessment. In particular, the first two motor impairments are associated with early prominent loss of dopaminergic neurons in the substantia nigra (Braak et al. 2003). Degeneration and neuropathological changes across serotinergic, noradrenergic, and cholinergic neurotransmitter pathways, also contribute to motor deficits (Braak et al. 2003; Jellinger, 2012). However symptomology is often variable and unpredictable, with a constellation of motor and non-motor symptoms identified throughout the course of disease (Figure 1; Kalia and Lang, 2015).

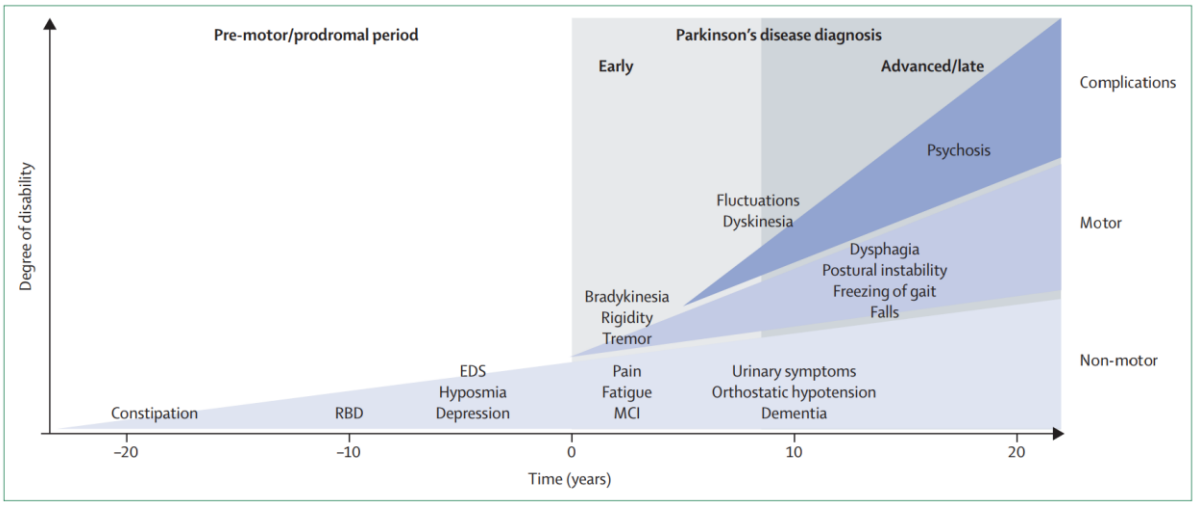


***Figure 1-1*: Clinical symptoms and course of PD progression (Kalia and Lang, 2015)**

Note: Diagnosis of PD occurs with the onset of motor symptomology (Time= 0 years). However there is a constellation of motor and non-motor symptoms that contribute to disability, and hypothesised non-motor symptoms which can precede diagnosis by up to 20 years (Postuma et al., 2012). Motor symptoms, such as postural instability with frequent falls and freezing gait tend to occur later in the disease. Long-term complications of pharmacological intervention also contribute to fluctuations in symptom presentation, dyskinesia and psychosis. EDS = excessive daytime sleepiness. MCI = Mild Cognitive Impairment. RBD= REM sleep behaviour disorder.

1.1.1. Clinical characteristics and motor symptoms

Clinical diagnosis of PD is based on a combination of cardinal motor symptoms: bradykinesia, rigidity and rest tremor (Table 1; Postuma, et al., 2015). In general, an individual may not experience all the cardinal motor features at diagnosis, and symptoms have different rates of progression, with faster disease progression in individuals with rigidity and bradykinesia than in those with predominant tremor (Jankovic et al. 1990). Early motor symptoms may include lugubrious or stiff facial expression, flexion of one arm with lack of swing while walking, monotonous quality of speech, or extreme slowing of movement. These early changes can be subtle, often going unnoticed by the patient or those around them, and become ascribed to aging. In late stages of the disease the face is often masked and expressionless, speech can be monotonous and slightly slurred, posture is flexed, and a pill rolling tremor is also common (Lees, Hardy and Revesz, 2009).

Table 1-1

MDS clinical diagnostic criteria for Parkinson's disease (Postuma et al., 2015)

A. Diagnosis of Parkinsonian Syndrome

Bradykinesia (i.e. slowness of initiation of voluntary movement with progressive reduction in speed and amplitude of repetitive actions) plus one or more of the following features:

- Muscular rigidity
- 4-6 Hz rest tremor
- Postural instability not caused by primary visual, vestibular, cerebellar or proprioceptive dysfunction

B. Exclusion criteria for Parkinson's disease

One or more of the following features suggest an alternative diagnosis:

- History of repeated strokes with stepwise progression of parkinsonian features
- History of repeated head injury
- History of encephalitis
- Neuroleptic treatment at onset of symptoms
- 1-methyl-4-phenyl-1,2,3,6,-tetrahydropyridine (MPTP) exposure
- Negative response to large doses of Levodopa (if malabsorption excluded)
- More than one affected relative (criteria generally no longer applied)
- Sustained remission
- Strictly unilateral features after 3 years
- Early severe autonomic involvement
- Early sever dementia with disturbances of memory, language and praxis
- Oculogyric crises
- Supranuclear gaze palsy
- Babinski sign
- Cerebellar signs
- Presence of a cerebral tumour or communication hydrocephalus on CT or MRI

C. Supportive prospective positive criteria for Parkinson's disease

Three or more of the following features are required for diagnosis of definite Parkinson's disease

- Unilateral onset
- Rest tremor present
- Progressive disorder
- Persistent asymmetry affecting the side of onset most
- Excellent response (70%-100%) to Levodopa
- Severe Levodopa-induced chorea
- Levodopa response for 5 years or more
- Clinical course of 10 years or more

1.1.2. Cognition in Parkinson's disease

Despite its prominence in research, a definitive cognitive profile in PD is difficult to establish (Kehagia, Barker and Robbins, 2010) and distinguishing a PD dementia profile from other neurodegenerative pathologies such as Lewy body dementia (DLB) and Alzheimer's disease (AD) remains troublesome (Emre et al., 2007). Identification of early cognitive impairment is of particular importance (Litvan et al., 2012) and is associated with increased caregiver burden (Jones et al., 2017), nursing home admission (Aarsland et al., 2001), hallucinations (Korczyn, 2001) and mortality (Marder et al., 1991). Establishing early decline is essential in

order to begin treatment, allocate support, and to develop new interventions which may improve clinical outcomes.

1.1.2.1. Cognitive characteristics

A wide variety of cognitive impairments have been reported in PD, including impaired attention, memory, visuospatial function and executive functioning (Marder, 2010; Dalrymple-Alford et al., 2011; Troster, 2011). The ability to maintain attention and vigilance is impaired in PDD and may fluctuate more than attentional deficits seen in AD (Ballard et al., 2002). Memory complaints in PDD are reported less often compared to other forms of dementia; with 67% of those with PDD reporting impaired memory compared to 90% of those with DLB and 100% of those with AD (Noe et al., 2004). Some suggest the memory deficit in PDD is one of retrieval, rather than encoding and storage (Emre et al., 2007), however there is a growing body of evidence showing recognition memory deficits in PDD on both verbal and non-verbal tasks (Whittington et al., 2000). Visuospatial functioning is substantially impaired in PD and appears worse than AD (Mosimann et al., 2004), with a marked impairment of construction and praxis (Cahn-Weiner, et al., 2003). However the cognitive profile of PDD is often understood as primarily an impairment of executive functioning, and deficits of memory or visuospatial processing may be more closely associated with executive dysfunction than individuals with AD (Emre et al. 2007).

1.1.2.2. Mild Cognitive Impairment and Dementia

Recently published guidelines by the Movement Disorders Society Task Force (MDS) have proposed diagnostic criteria for PDMCI (Table 2; Litvan et al., 2012). Two levels of assessment are suggested which require established cognitive decline that does not significantly interfere with functional independence. Level I consists of a brief assessment demonstrating impairment on measures of global cognition, or impairment on one or two specific measures across five cognitive domains (attention, memory, visuospatial functioning, executive functioning and language). Level II assessment proposes more comprehensive criteria, with impairment established in at least two measures across

attention, memory, visuospatial functioning, executive functioning and language. Impairment is required on at least two neuropsychological tests within one or two of these cognitive domains. That said, the level of impairment is not fixed and within 1 or 2 standard deviations below normative data. Recent published research examining these options proposed that, to capture a heightened risk of developing dementia in a 4 year period, optimal PDMCI criteria should identify at least two impairments at 1.5 standard deviations below the normal range within a single cognitive domain (Wood et al., 2016).

Table 1-2

Criteria for the diagnosis of PDMCI (Litvan et al., 2012)

I. Inclusion criteria

a. Diagnosis of Parkinson's disease as based on the Queen's Square Brain Bank criteria
b. Gradual decline, in the context of established PD, in cognitive ability reported by either the patient or informant, or observed by the clinician
c. Cognitive deficits are either formal neuropsychological testing or a scale of global cognitive abilities (detailed in section III)
d. Cognitive deficits are not sufficient to interfere significantly with functional independence, although subtle difficulties on complex functional tasks may be present

II. Exclusion criteria

a. Diagnosis of PD dementia based on the MDS task force proposed criteria (Emre et al., 2007).
b. Other primary explanations for cognitive impairment (e.g. delirium, stroke, major depression, metabolic abnormalities, adverse effects of medication, or head trauma)
c. Other PD-associated comorbid conditions (e.g. motor impairment or severe anxiety, depression, excessive daytime sleepiness, or psychosis) that, in the opinion of the clinician, significantly influence cognitive testing

III. Specific guidelines for PDMCI level I and level II categories

A. Level I (abbreviated assessment)
- Impairment on a scale of global cognitive abilities validated for use in PD or
- Impairment on at least two tests, when a limited battery of neuropsychological tests is performed (i.e. the battery includes less than two tests within each of the five cognitive domains, or less than five cognitive domains are assessed)

B. Level II (comprehensive assessment)
- Neuropsychological testing that includes two tests within each of the five cognitive domains (i.e. attention and working memory, executive, language, memory and visuospatial)
- Impairment on at least two neuropsychological tests, represented by either two impaired tests in one cognitive domain or one impaired test in two different cognitive domains
- Impairment on neuropsychological tests may be demonstrated by:
  - Performance approximately 1 or 2 SDs below appropriate norms or
  - Significant decline demonstrated by serial cognitive testing or
  - Significant decline from estimated premorbid levels

IV. Subtype classification for PDMCI (optional, requires two tests for each of the five cognitive domains assessed and is strongly suggested for research purposes)

- PDMCI single domain –abnormalities on two tests within a single cognitive domain (specify the domain), with other domains unimpaired or
- PDMCI multiple domain –abnormalities on a least one test in two or more cognitive domains (specify the domains)

Diagnosis of dementia is established if there are significant deficits in at least two cognitive domains, which disrupt normal daily functioning (Table 2; Emre et al., 2007). This cognitive impairment must also occur with established PD motor symptomology in order to distinguish PDD from DLB pathology. To distinguish impairment which may have been caused by another symptom or condition other than PDD, the MDS has also proposed criteria for "probable: PDD and "possible" PDD (Table 3; Emre et al., 2007). When the time interval between the development of motor symptoms and significant loss of everyday functional independence is unknown, a diagnosis of possible PDD is preferable to probable PDD, unless a diagnosis of DLB is more likely (McKeith and Mosimann, 2004).

Table 1-3

Features of dementia associated with Parkinson's disease (Emre et al., 2007)

II.	**Core features**
	a. Diagnosis of Parkinson's disease according to the Queen's Square Brain Bank criteria
	b. A dementia syndrome with insidious onset and slow progression, developing within the context of established Parkinson's disease and diagnosed by history, clinical and mental examination, defined as:
	i. Impairment in more than one cognitive domain
	ii. Representing a decline from premorbid level
	iii. Deficits severe enough to impair daily life (social, occupational, or personal care), independent of the impairment ascribable to motor or autonomic symptoms
III.	**Associated clinical features**
	a. Cognitive features:
	i. Attention: Impaired. Impairment in spontaneous and focused attention, poor performance in attentional tasks; performance may fluctuate during the day and from day to day
	ii. Executive functioning: Impaired. Impairment in tasks requiring initiation, planning, concept formation, rule finding, set shifting or set maintenance; impaired mental speed (bradyphrenia)
	iii. Visuospatial functioning: Impaired. Impairment in tasks requiring visual spatial orientation, perception, or construction
	iv. Memory: Impaired. Impairment in free recall of recent events or in tasks requiring learning new material, memory usually improves cueing, recognition is usually better than free recall
	v. Language: Core functions largely preserved. Word finding difficulties and impaired comprehension of complex sentences may be present
	b. Behavioural features:
	i. Apathy: decreased spontaneity; loss of motivation, interest and effortful behaviour
	ii. Changes in personality and mood, including depressive features and anxiety
	iii. Hallucinations: mostly visual, usually complex, formed visons of people, animals or objects
	iv. Delusions: usually paranoid, such an infidelity or phantom boarder (unwelcome guests living in the home) delusions
	v. Excessive daytime sleepiness
IV.	**Features which do not exclude PDD, but make diagnosis uncertain**

i. Co-existence of any other abnormality which may be itself cause cognitive impairment, but judged not to be the cause of dementia, e.g. presence of relevant vascular disease in imaging
ii. Time interval between the development of motor and cognitive symptoms not known

V. Features suggesting other conditions or diseases as cause of mental impairment, which present make it impossible to reliably diagnose PDD

i. Cognitive and behavioural symptoms appearing solely in the context of other conditions such as:
Acute confusion due to:
a. Systematic diseases or abnormalities
b. Drug intoxication
Major depression according to DSM-5
ii. Features compatible with "Probable Vascular dementia" criteria according to NINDS-AIREN (dementia in the context of cerebrovascular disease as indicated by focal signs in neurological exam such as hemiparesis, sensory deficits, and evidence of relevant cerebrovascular disease by brain imagine and a relationship between the two as indicated by the presence of one or more of the following: onset of dementia within 3 months after a recognised stroke, abrupt deterioration in cognitive fluctuations and fluctuating, stepwise progression of cognitive deficits)

Table 1-4

Criteria for the diagnosis of Probable and Possible PDD (Emre et al., 2007)

Probable PDD

A. Core features: Both must be present
B. Associated clinical features:
- Typical profile of cognitive deficits including impairment in at least two of the four core cognitive domains (Impaired attention which may fluctuate, impaired executive functioning, impaired visuo-spatial functions, and impaired free recall memory which improves with cueing)
- The presence of at least one behavioural symptom (apathy, depressed or anxious mood, hallucinations, delusions, excessive daytime sleepiness) supports the diagnosis of Probably PDD, lack of behavioural symptoms, however, does not exclude diagnosis

Possible PDD

A. Core features: Both must be present
B. Associated clinical features:
- Atypical profile of cognitive deficits including impairment in one or more domains, such as prominent or receptive-type (fluent) aphasia, or pure storage-failure type amnesia (memory does not improve with cueing or in recognition tasks) with preserved attention
- Behavioural symptoms may or may not be present

OR

C. One of more of the group III features present
D. None of the group IV features present

1.1.3. Additional non-motor symptoms

PD presents with a heterogeneous constellation of non-motor symptoms (Zhang et al., 2015; Marras and Chaudhuri, 2015). Early non-motor features include impaired olfaction,

constipation, depression, excessive daytime sleepiness, and rapid eye movement sleep behaviour disorder (Kalia and Lang, 2015). Constipation and mood appear to approximately double an individual's risk of subsequent PD (Noyce et al., 2012) and significant increased risk is also seen in those who have never smoked (Ascherio et al., 2003). As the disease progresses, patients experience increased falls (Wielinski, et al., 2005), chewing and swallowing difficulties, drooling of saliva, and incontinence complaints (Pandya, Kubu and Giroux, 2008). Due to the large array of non-motor symptoms across the course of PD, comprehensive assessment across multiple domains related to health is essential to accurately meet the need of patients (Chaudhuri, Yates and Martinez-Martin, 2005).

1.1.3.1. Functional independence –Activities of Daily Living

Motor and cognitive symptoms in PD affect functional independence and a patient's ability to complete daily activities (Guttman et al., 2003). Low degree of functional independence has a significant impact on PD severity, prognosis, self-reported distress, and well-being for patients with PD (Herlofson, and Larsen, 2003). Additionally, reduced functional independence has a greater burden on caregivers than motor symptoms (Leiknes, Lien and Severinsson, 2015).

Functional independence is measured as both Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADL). ADL activities are related to personal care, including bathing, dressing and eating (World Health Organisation, 2001). IADLs relate to more complex activities which require a higher level of personal autonomy, such as meal preparation, managing medications or managing finances (World Health Organisation, 2001). In PD it is important to establish whether functional independence is compromised due to motor ability or cognitive impairment, and is a distinguishing factor between PDMCI and PDD (Litvan et al., 2012; Emre et al., 2007).

1.1.3.2. Neuropsychiatric symptoms – Mood and Behaviour

Depression is a common feature across the course of PD, with prevalence rates varying between 7% and 70% (Burn, 2002). In later stages of the disease apathy (Pedersen et al., 2011), anxiety (Alamri, et al., 2015), and hallucinations and delusions (Weintraub et al, 2006) are common. Symptoms of depression and apathy can be subtle due to the masked facial expression symptomatic of PD, but can have a major impact on the quality of life of patients and their caregivers (Jones et al., 2017), and may negatively influence cognitive functions (Scheider, Sendak, and Yang, 2015).

1.2. interRAI-Home Care Assessment

interRAI stands for 'International Resident Assessment Instrument' and the name refers to both a suite of assessment instruments and to the organisation that develops them (Gordon, 2008). There are several interRAI assessment protocols across public health services (such as Acute Care, Long-Term Care, Palliative Care, and Intellectual Disability) and the assessments are being used in around 22 countries throughout the world (Morris et al, 2009). The interRAI-HC assessment focuses on a person's functioning and quality of life by assessing health needs, and facilitates appropriate referrals and intervention (Burrows et al., 2000). It has been established as a reliable assessment tool (Morris et al., 1997; Hirdes et al., 2008; Burrows et al., 2000; de Almeida, et al., 2015; Parsons et al., 2013; Kim et al., 2015) and when used in multiple assessments can be used to evaluate a person's developing need and response to care services (Morris et al., 2009). The assessment evaluates multiple key domains, including: cognition, communication and vision, mood and behaviour, psychosocial well-being, functional status, continence, nutrition, and social support (see Appendix A and Appendix B for interRAI-HC assessment). In addition, it aggregates data across several internal outcome measures established to assess cognition (Cognitive Performance Scale; Morris et al., 1994), depression (Depression Rating Scale; Burrows et al., 2000), activities of daily living (Morris, Fries and Morris, 1999) and pain (Fries et al., 2001). These outcome scales propose to highlight and summarise the health need of

an individual and have been developed to provide valid and reliable descriptions of older person's health (Morris et al., 2000).

In 2003, the NZ Guidelines Group (NZGG) noted dissatisfaction between best and actual assessment processes and practices for older person's health within New Zealand (NZGG, 2003). Critical evaluation of available comprehensive assessments was completed (Martin and Martin, 2003) and the NZGG recommended that the interRAI-HC assessment be applied as the nationwide standard of assessment in the elderly (2003). Subsequently, five District Health Boards across New Zealand piloted the interRAI-HC (Weidenbhom et al., 2006) and a version of the instrument was developed for use with older persons at risk of admission into aged residential care or requiring long-term support. The interRAI-HC has been in use in community care assessment in New Zealand since 2012, and is now mandated to ascertain a person's level of need, to develop a care plan, and to identify appropriate services and support options (Ryall, 2013). Referred by general health practitioners, community health workers, or hospital based health professionals, interRAI-HC assessments are conducted by trained health professionals (mainly nurses and social workers) and are completed mostly in the home. The instrument itself is not designed for or accommodates the assessment of any specific disease or condition, and is not a diagnostic tool (Morris et al, 2009). However current diagnoses are noted within the assessment, to document conditions which may impact ADLs, cognition, mood and behaviour, need for monitoring or risk of death (Morris et al, 2009).

It is anticipated that 46,000 home care assessments will be performed annually (Schluter et al., 2016), and although information is primarily to inform personal care decisions, opportunities exist to better understand older person's health and health care needs on a national level (Nishtala and Jamieson, 2017). Because frail older persons usually have complex and challenging health needs, home care services should be adapted to meet this population (Parsons et al., 2013). As a dominant chronic disease amongst our older population, a suitable comprehensive evaluation for PD is essential in order to accurately determine community need.

1.3. Aim of the current study

The current study examines the characterisation of cognitive functioning, motor symptoms and non-motor symptoms for PD using the interRAI-HC. A small sample of individuals were identified by detailed neuropsychological testing as PDN, PDMCI and PDD, so that the relevance of the interRAI-HC could be evaluated for these groups. Characterisation of PD will be compared between results of detailed neuropsychological testing and elements of the interRAI-HC. It is expected that detailed neuropsychological testing will distinguish clinical characteristics, cognitive functioning, activities of daily living, and symptoms of mood and behaviour for this sample by cognitive status. It is the aim of this study to ascertain whether the interRAI-HC can similarly distinguish these groups from measures of cognition, activities of daily living, or mood and behaviour. This study will also explore whether detailed neuropsychological testing and cognitive status can validate some aspects of the interRAI-HC for the PD population, such as cognition or activities of daily living. This study will examine individual items within sections of the interRAI-HC as well as aggregate outcome measures developed within the instrument.

2. Method

2.1. Participants

Participants were recruited following ethical approval from the Southern Health and Disability Ethics Committee as part of the NZBRI longitudinal progression study (NZBRI study; URB/09/08/037/AM02). Figure 2-1 outlines the sample selection process for this study. Participants were selected from 1) the existing participant database of the NZBRI study (NZBRI database) and 2) through a specialised clinic for Parkinson's disease (Clinic database). For final inclusion in this study, participants were required to have received both detailed neuropsychological testing conducted at NZBRI and a Canterbury District Health Board (CDHB) assessment on the interRAI-HC test within 183 days (6 month proximity between testing).

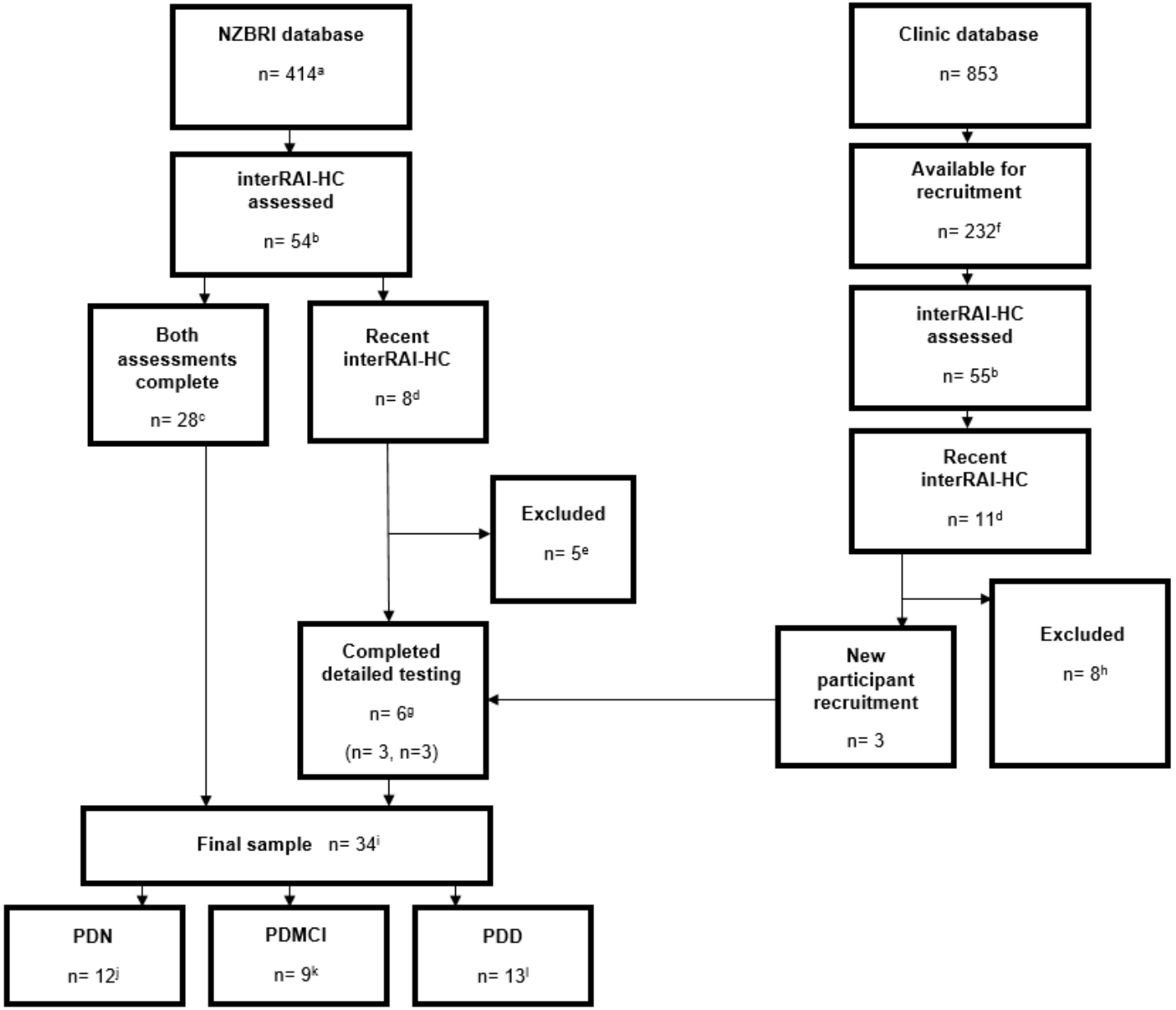


***Figure 2-1*: Summary of sample selection**

Notes:

a Existing participants of *Progressive Changes of Potential Indicators in Parkinson's Disease* (NZBRI study), a longitudinal study of NZBRI. In this study, Parkinson's disease participants were recruited from the *Van Der Veer* clinic, a specialist clinic for individuals with Parkinsonian symptomology, and required a diagnosis of Parkinson's disease and to be aged between 65-85 years old. Exclusion criteria included a current diagnosis of dementia, history of moderate or severe head injury, history of stroke or neurosurgery, an active major medical illness which could impact participation (i.e. cancer treatment), recent psychiatric illness requiring hospitalisation, major depression diagnosis in the last 6 months and a history of renal disease.

b Complete interRAI-HC assessments identified by NHI number through the Canterbury District Health Board (CDHB).

c Both neuropsychological testing and interRAI-HC assessment completed within 183 days (6 months).

d Individuals had completed an interRAI-HC assessment within 120 days (4 months) and could potentially be recruited to complete neuropsychological assessment within 183 day criteria.

e Participants of the NZBRI study who were excluded from additional neuropsychological testing for this research; n=2 declined participation, n=2 unable to complete testing within 183 days, n=1 too unwell to participate.

f Clients who had not yet been approached for participation in the NZBRI study and gave consent to be contacted for participation in research of this nature.

g Successfully approached and completed detailed neuropsychological test battery at NZBRI within 183 days of recent interRAI-HC; n=3 existing participants from NZBRI study, n=3 new participants from clinic database.

h Individuals who were excluded from recruitment to the NZBRI study; n=2 did not meet Parkinson's disease diagnosis, n=2 too unwell to participate, n=2 declined participation, n= 1 interRAI-HC could not be located, n=1 could not be recruited and tested on neuropsychological battery within 183 days.

i Data received from the CDHB; n=34 complete interRAI=HC assessments and n=31 of the interRAI-HC Outcome Measure data.

j Criteria for Parkinson's disease normative cognition group (PDN): Intact cognition and memory impairments normative to age and education as shown by scores >-1.5 SD of standardised norms, or a score -1.5 SD below standardised norms in less than two tests in any single cognitive domain.

k Criteria for Parkinson's Disease with mild cognitive impairment group (PDMCI): 1) Objective memory impairment on two or more tests (score -1.5 SD below standardised age and education corrected normative data) in a single cognitive domain; 2) at least one impaired global mental status score from MoCA (<26), DRS-2 (scaled score of <9) or ADAS-Cog (>9); 3) subjective memory complaint by participant or informant on the CDR; and 4) exclusion of dementia criteria on the CDR as a score of 0 – 0.5 and preserved activities of daily living judged by significant other and/or the interviewer.

l Criteria for Parkinson's Disease with dementia group (PDD): 1) Significant cognitive impairment on two or more tests (score -2 SD below standardised age and education corrected normative data) in multiple cognitive domains; at least one impaired global mental status score from MoCA (<22), DRS-2 (scaled score of <6) or ADAS-Cog (>15); 3) subjective memory complaint by participant or informant on the CDR; compromised activities of daily living as a score of 1< on the CDR or 1.5< on the ADL-IS.

Participants of the NZBRI study (Figure 2-1: NZBRI database) were verified via National Heath Index number (NHI) whether they had completed neuropsychological testing and an interRAI-HC assessment within six months. Of the 414 active participants in the NZBRI study, 54 had completed an interRAI-HC assessment, and 28 participants had received both interRAI-HC and neuropsychological testing within 183 days (six months). An additional eight participants were selected having completed a recent interRAI-HC assessment with potential to receive neuropsychological testing within 183 days. Three of those participants were successfully given detailed neuropsychological testing through NZBRI. Five participants were excluded as they declined neuropsychological assessment (n= 2), were unable to receive testing within 183 days of their interRAI-HC (n= 2) or were too unwell to participate (n=1).

The client database from the *Van Der Veer* clinic for Parkinson's disease (Figure 2-1: Clinic database) were also reviewed and 11 clients were identified to have had received a recent interRAI-HC and had given consent to be contacted for future research. Of this recruitment drive, three participants were successfully enlisted into the study and received detailed neuropsychological testing within 183 days of their interRAI-HC assessment. Eight potential participants were excluded from the study as they were too unwell to participate (n= 2), did not meet Parkinson's disease diagnosis (n=2), declined participation (n=2), their interRAI-HC could not be located (n= 1), or they were unable to complete testing within 183 days of their interRAI-HC (n= 1).

The final sample of 34 participants were classified on the basis of their cognitive performance and assessment of everyday function (Figure 2-1). Participants were identified as showing cognitive function within the normal range (PDN; n= 12), with mild cognitive impairment (PDMCI; n= 9) PDMCI or with dementia (PDD; n= 13). Table 2-1 summarises the demographics of the three groups, including median and upper and lower bounds of the quartile range for years of disease duration and year spent in education.

Table 2-1

Demographics of participants (n=34)

	PDN (n= 12)		PDMCI (n=9)		PDD (n=13)	
	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)
Age	71.0	(70.0, 74.0)	75.0	(70.5, 77.0)	76.0	(71.0, 78.3)
Education (yrs)	12.0	(10.5, 12.0)	11.0	(10.0, 13.0)	14.0	(11.8, 15.3)
Disease Duration (yrs)	8.0	(6.0, 12.0)	8.0	(2.5, 11.25)	10.0	(6.8, 11.8)
Male/ Female	8 / 4		7 / 2		9 / 4	
NZ European/ Other European/ Asian	9 / 3 / 0		8 / 0 / 1		10 / 3 / 0	

Note: Md = Median; Q_1 = Lower Quartile; Q_3= Upper Quartile

Inclusion criteria for the PDN group was that they did not meet NZBRI criteria for PDMCI. Participants were identified as PDMCI if: 1) there was an objective impairment on two or more tests at a score -1.5 SD below standardised age and education corrected normative data within a single cognitive domain; 2) at least one impaired global mental status score from Montreal Cognitive Assessment (MoCA; <26), Dementia Rating Scale-2 (DRS-2; scaled score of <9) or Alzheimer's Disease Assessment Scale-Cognitive Subscale (ADAS-Cog; >9), 3) a subjective memory complaint by participant or informant on the Clinical Dementia Rating scale (CDR) of 0 or 0.5, and 4) largely preserved instrumental activities of daily living judged by significant other and/or the interviewer.

Criteria for the PDD group required: 1) significant cognitive impairment on any tests across at least two cognitive domains (score -2 SD below standardised age and education corrected normative data); 2) at least one impaired global mental status score from MoCA (<22), DRS-2 (scaled score of <6) or ADAS-Cog (>15); and 3) compromised activities of daily living, including 1 or more on the CDR or >1.5 on the Activities of Daily Living – International Scale (ADL-IS).

2.2. Comprehensive Assessment

2.2.1. Detailed neuropsychological assessment

As described below, detailed neuropsychological testing included clinical measures of Parkinson's disease, neuropsychiatric measures, and both global scales and individual tests of cognition across five cognitive domains (MDS recommendations; Litvan et al., 2012). Neuropsychological assessment was administered by a trained research assistant at NZBRI with strict adherence to standardised scripts and scoring.

2.2.1.1. Clinical Assessment of Parkinson's disease

The Unified Parkinson's Disease Rating Scale (UPDRS; Goetz, et al., 2008) and the Hoehn and Yahr Staging of Parkinson's disease (H&Y; Goetz, et al., 2004) were given to assess clinical characteristics associated with Parkinsonian pathology.

2.2.1.2. Global Functioning

The Mini-Mental Status Examination (MMSE; Folstein, et al., 1975; Mitchell, 2009), Montreal Cognitive Assessment (MoCA; Nasreddine, et al., 2005; Dalrymple-Alford, et al, 2010), Alzheimer's Disease Assessment Scale –Cognitive Subscale (ADAS-Cog; Rosen, Mohs, and Davis, 1984; Grochowalski, et al., 2016), Dementia Rating Scale -2 (DRS-2; Jurica, et al., 2001; Aarsland et al., 2003; Matteau, et al., 2012) and Activities of Daily Living-International Scale (ADL-IS; Reisberg, et al., 2001) assessments were also given to assess global cognition and everyday functioning.

2.2.1.3. Attention, Working Memory and Processing Speed

To assess attention, working memory and processing speed, participants completed subtests of digit span (WAIS-IV; Digit forwards/backwards; Digit Ordering; Weschler, 2008a, 2008b), the Test of Everyday Attention –Map Search (TEA; Robertson, et al., 2001), the Delis-Kaplan Stroop task (Stroop Colour and Word naming; DKEFS; Delis, Kaplan & Kramer, 2001) and trail making task (Trails A; DKEFS; Delis, Kaplan & Kramer, 2001).

2.2.1.4. Executive Function

The assessment of executive functioning involved several subtests from the Delis-Kaplin Executive Functioning Scale (DKEFS; Delis, Kaplan & Kramer, 2001), including the letter fluency, action fluency and category fluency tasks, category switching task, the Stroop colour word interference task and the Trail B symbol digit modality task.

2.2.1.5. Learning and Memory

Learning and memory was examined using the short form of the California verbal learning test (DKEFS; CVLT; Delis, Kramer, and Ober, 2000) and the Rey-Osterrieth Complex Figure (RCFT; Meyers and Meyers, 1995).

2.2.1.6. Visuospatial Functioning

Visual spatial functioning was tested using the Judgement of Line Orientation test (JLO; Benton, Hannay, and Varney, 1975), the Visual Object and Space Perception Test (VOSP; Warrington and James, 1991), the picture completion subset (WAIS-IV; Weschler, 2008a, 2008b) and the visual-construction copy task of the Rey- Osterrieth Complex Figure test (RCFT –Copy; Meyers and Meyers, 1995).

2.2.1.7. Language

Language was assessed using the Boston naming test (Kaplan, Goodglass & Weintraub, 1983), the language measure for the Alzheimer's Disease Assessment Scale –Cognitive Subscale (ADAS-Cog; Rosen, Mohs, and Davis, 1984) and the Dementia Rating Scale (DRS-2; Jurica, et al., 2001).

2.2.1.8. Neuropsychiatric measures

The Neuropsychiatric Inventory (NPI; Cummings, 1997; de Medeiros, et al., 2010), Geriatric Depression Scale (GDS; Brink et al., 1992), and Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983; Norton, et al., 2013) were given to assess behavioural and psychiatric symptomology.

2.2.2. interRAI-Home Care Assessment

The interRAI-HC is a standardised screening tool, designed for clinical use (interRAI, 2009). The assessment consists of 236 questions which are divided into 20 domains: A: Identification Information, B: Intake and Initial History, C: Cognition, D: Communication and Vision, E: Mood and Behaviour, F: Psychosocial Well-being, G: Functional Status, H: Continence, I: Disease Diagnosis, J: Health Conditions, K: Oral and Nutritional Status, L: Skin Condition, M: Medications, N: Treatment and Procedures, O: Responsibility, P: Social Support, Q: Environmental assessment, R: Discharge potential and Overall status. S: Discharge, and T: Assessment information. Data within the full assessment is then used form 27 Outcome scales, including the Cognitive Performance scale (CPS; Morris et al., 1994), the Depression Rating scale (DRS; Burrows et al, 2000), and Activities of Daily Living scale (ADL –Long Form; IADL Performance Scale; IADL Capacity Scale; Morris, Fries and Morris, 1999) to characterise severity of symptomology, develop a profile of need for the individual and plan intervention.

Two versions of the interRAI-HC form have been used within the CDHB and data from both forms were analysed within this study (see Table 2-3); the Minimum Data Set –Home Care assessment (MDS-HC version 2.0; Hirdes et al., 2000; Appendix B) and the interRAI-Home Care assessment (interRAI-HC Version 9.1 NZ customisation; interRAI, 2012; Appendix A). Data received from the MDS-HC was recoded to match the format of the interRAI-HC (see Appendix C).

interRAI-HC data was retrieved through the CDHB using participant NHI and interRAI-HC assessment date. Data of the full interRAI-HC assessment was received for all participants in the final sample, however Outcome Scale data could not be located for n= 3 participants.

Table 2-2

Full assessment and outcome measure data received from the CDHB per version of the interRAI-HC

	MDS-HC	interRAI-HC	Total
Full Assessment data	18	16	34
Outcome scale data	15	16	31

Note: MDS-HC= interRAI-HC 2.0 version (Appendix A); interRAI-HC= interRAI 9.1 NZ version (Appendix B).

3. Results

3.1. Statistical analyses

Due to the nature of the data in this study, a number of analyses, including non-parametric analyses, were employed to interpret results. Median (Md) and quartile range (Q_1= Lower quartile; Q_3 = Upper quartile) are used to describe the data, due to the expected distribution and small sample size. The Kruskal-Wallis test by ranks was used to test analysis of variance of group scores on the neuropsychological battery and outcome scores in the interRAI-HC, and post hoc analyses were completed using the Conover-Iman test. Fisher Exact tests were used to test group differences and complete post hoc analyses across nominal variables within the interRAI-HC. Correlational analyses between neuropsychological and interRAI-HC measures used Spearman's rank correlation coefficient. Analyses were completed using the MedCalc statistical software package.

3.2. Parkinson's disease characterised by detailed neuropsychological testing

Table 3-1 summarises the demographics of the sample and results of detailed neuropsychological testing measuring motor symptoms, global cognition, activities of daily living and neuropsychiatric symptoms in the three PD groups. Analysis of variance showed no significant group differences between age, education or duration of disease diagnosis.

However, the three groups differed significantly on global cognition measures and in activities of daily living, with increasingly poor scores from PD-N to PD-MCI and PDD (Conover-Iman post-hoc test, $p<0.05$). The PDD group generally exhibited worse measures of parkinsonism and motor symptoms, compared to the PD-N and PD-MCI groups, which did not differ. A significant group difference was observed in the Neuropsychiatric Inventory, but not in specific measures of anxiety or depression.

Table 3-1

Demographics, motor symptoms, global cognition, activities of daily living and neuropsychiatric characteristics of Parkinson's disease patient sample (n=34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	
Demographics							
Male / Female	8 / 4		7 / 2		9 / 4		
Age (yrs)	71.0	(70.0, 74.0)	75.0	(70.5, 77.0)	76.0	(71.0, 78.3)	H(2)= 1.93; p=0.38
Education (yrs)	12.0	(10.5, 12.0)	11.0	(10.0, 13.0)	14.0	(11.8, 15.3)	H(2)= 4.01 , p=0.13
Diagnosis Duration (yrs)	8.0	(6.00, 12.0)	8.0	(2.5, 11.3)	10.00	(6.8, 11.8)	H(2)=0.85, p=0.65
Parkinsonian and motor symptoms							
H&Y	2.5	(1.5, 3.0)	2.3	(1.8, 2.5)	3.00	(2.5, 4.0)	H(2)=5.96 p<.05; c*
UPDRS-I	7.0	(1.5, 14.5)	6.0	(3.0, 8.5)	11.5	(9.0, 21.0)	H(2)=6.73, p<.05; b*c*
UPDRS-II	18.5	(11.5, 23.5)	12.4	(11.1, 15.7)	23.0	(17.9, 28.5)	H(2)= 7.64, p<.05; c*
UPDRS-III	34.1	(22.3, 46.5)	26.4	(19.5, 36.1)	49.0	(14.5, 72.9)	H(2)=10.88, p<.01; b*** c***
Global measures of cognition							
MMSE	28.0	(27.0, 29.5)	26.0	(25.8, 28.0)	24.0	(22.0, 25.0)	H(2)=20.19, p<.001; a* b** c**
MoCA	26.0	(25.5, 27.0)	23.0	(20.8, 25.0)	20.0	(15.5, 21.3)	H(2)=21.42, p<.001; a*** b*** c**
ADAS-Cog	6.9	(5.1, 8.2)	10.0	(9.6, 13.4)	19.8	(16.6, 26.6)	H(2)=22.33, p<.001; a*** b*** c***
DRS -2	12.0	(10.0, 13.0)	10.0	(8.5, 11.5)	6.0	(3.75, 6.3)	H(2)=23.28, p<.001; a* b*** c***
Activities of Daily Living							
ADL-IS	0.3	(0.1, 0.6)	1.1	(0.4, 1.9)	1.9	(1.7, 2.5)	H(2)= 18.25, p<.001; a* b*** c***
Neuropsychiatric measures							
NPI	1.0	(0.0, 3.0)	3.0	(1.0, 6.0)	10.0	(6.5, 17.3)	H(2)=8.15, p<.05; b* c*
GDS	1.0	(1.0, 1.0)	2.0	(2.0, 2.8)	4.0	(4.0, 5.0)	H(2)= 0.93, p=0.53
HADS -Anxiety	7.5	(1.0, 9.0)	8.0	(2.8, 10.3)	8.0	(7.3, 10.0)	H(2)= 1.06, p=0.58
HADS -Depression	5.0	(3.0, 7.0)	7.0	(4.8, 9.3)	7.0	(4.5, 8.0)	H(2)= 1.119, p=0.57

Note: Values are reported as median (Md), and the upper and lower bounds of the quartile range (Lower quartile= Q_1; Upper quartile= Q_3). Analyses/Analysis of variance: Kruskal-Wallis. Post hoc pairwise comparison/Conover-Iman test between: a= PDN v PDMCI; b= PDN v PDD; c= PDMCI v PDD; *p< 0.05; ** p< 0.01; ***p<0.005.

Significant group differences were also observed in all cognitive domains assessed by detailed neuropsychological testing ($p<0.001$). Table 3-2 summarises the median z-scores for each individual test per cognitive domain, and combined z-score for each cognitive domain. Median z-scores for PDN did not fall below -1.0 on any measure in any cognitive domain, and domain scores tended to reflect unimpaired cognition relative to norms, except for the combined language z-score which appeared elevated. Results for PDMCI showed early cognitive impairment, with one median z-score on individual tests falling below -1.0 or -2.0 in every cognitive domain except language, and in two tests of attention and working memory, and learning and memory. PDD median scores showed significant impairment, with several median z-scores of -3.0, indicating significant impairment and cognitive ability -3SD below expected norms.

Group differences were observed in all individual tests except digits forward and backward (Digit F/B; Attention, Working memory and Processing speed) and the Boston Naming subtest (Language). PDD exhibited worse performance as compared to PDMCI on every measure of executive functioning ($p<0.001$), although PDN and PDMCI did not differ. Picture completion, a measure of visuospatial functioning, distinguished significant differences across all three groups ($p<0.005$).

The three groups differed significantly across all combined cognitive domains, and a progressive decline of cognitive function can be seen between PDN compared to PDMCI, and PDMCI to PDD in attention and working memory, executive functioning, learning and memory, visuospatial functioning, language, and global cognition. Post hoc analyses supported this trend as PDD performed worse than PDN in all cognitive domains, and showed greater impairment compared to PDMCI in all cognitive domains except for visuospatial functioning. In this way, the global z-score, which is a combined aggregate of average scores on all tests in all cognitive domains, also showed significant progression of cognitive decline between PDN, PDMCI and PDD.

Table 3-2

Cognitive characteristics per cognitive domain of the sample (n=34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	
Attention, Working Memory and Processing Speed							
Digits F/B	0.5	(0.2, 1.0)	0.3	(-0.2, 1.1)	0.0	(-1.1, 0.4)	H(2)= 4.42; p= 0.11
Digit Ordering	-0.5	(-1.7, 0.1)	-1.4	(-1.9, -0.3)	-2.6	(-3.0, -2.0)	H(2)= 13.40; p<0.005; b*** c***
TEA (Map Search)	-0.7	(-1.0, 0.0)	-2.0	(-2.8, -1.6)	-2.7	(-3.0, -2.2)	H(2)= 18.51; p<0.001; a*** b***
Stroop Colour	0.2	(-0.5, 0.3)	-0.7	(-1.8, 0.3)	-3.0	(-3.0, -1.3)	H(2)= 14.56; p<0.001; b*** c***
Stroop Word	0.0	(-0.5, 0.7)	0.0	(-1.3, 0.8)	-1.0	(-2.3, -0.7)	H(2)= 9.01; p<0.05; b* c*
Trails A	0.4	(-0.3, 0.7)	-0.5	(-1.6, 0.8)	-3.0	(-3.0, -1.5)	H(2)= 17.78; p<0.005; b*** c***
Domain Score	**-0.1**	**(-0.5, 0.2)**	**-0.7**	**(-1.2, -0.3)**	**-1.9**	**(-2.2, -1.5)**	**H(2)= 20.74; p<0.001; b* c***
Executive Function							
Letter Fluency	0.7	(0.0, 1.3)	1.0	(0.1, 1.6)	-1.3	(-1.8, -0.5)	H(2)= 13.39; p<0.005; b*** c***
Action Fluency	-0.7	(-1.1, 0.3)	-1.7	(-2.3, -1.0)	-2.5	(-3.0, 2.3)	H(2)= 20.82; p<0.001; b*** c***
Category Fluency	0.7	(0.2, 1.0)	-0.3	(-1.8, 0.9)	-1.3	(-2.0, -0.7)	H(2)= 20.87; p<0.001; b*** c***
Category Switching	0.0	(-0.7, 1.0)	-0.3	(-1.4, 0.8)	-3.0	(-3.0, -2.8)	H(2)= 19.99; p<0.001; b*** c***
Trails B	0.4	(-0.2, 0.6)	-0.6	(-1.6, 0.6)	-3.0	(-3.0, -2.9)	H(2)= 20.30; p<0.001; b*** c***
Stroop Interference	0.5	(-0.3, 0.8)	-0.3	(-1.1, 0.4)	-3.0	(-3.0, -2.2)	H(2)= 20.98; p<0.001; b*** c***
Domain Score	**0.1**	**(-0.1, 0.8)**	**-0.4**	**(-0.9, 0.3)**	**-2.2**	**(-2.5, -1.8)**	**H(2)= 24.11; p<0.001; b*** c***
Learning and Memory							
CVLT Free Recall	-0.1	(-0.3, 0.6)	-0.8	(-1.1, 0.0)	-2.5	(-3.0, -1.6)	H(2)= 21.83; p<0.001; b*** c***
CVLT Short Delay	-0.3	(-1.0, 0.5)	-1.0	(-1.1, 0.5)	-2.0	(-2.5, -1.5)	H(2)= 18.99; p<0.001; b*** c***
CVLT Long Delay	0.3	(-0.7, 1.0)	0.0	(-1.1, 0.0)	-1.5	(-1.6, -1.0)	H(2)= 14.33; p<0.001; b***
Rey Immediate	-0.2	(-0.9, 0.8)	-1.7	(-2.3, -1.1)	-1.9	(-2.6, -1.6)	H(2)= 11.37; p<0.005; b***
Rey Delayed	-0.8	(-1.3, 1.2)	-2.3	(-2.6, -1.6)	-2.3	(-2.5, -1.4)	H(2)= 14.44; p<0.005; a*** b***
Domain Score	**0.1**	**(-0.7, 0.3)**	**-0.7**	**(-1.2, -0.7)**	**-1.9**	**(-2.1, -1.8)**	**H(2)= 22.51; p<0.001; b*** c***
Visuospatial							
JOL	0.0	(-0.4, 0.4)	-1.4	(-1.78, -0.9)	-1.5	(-2.3, -0.6)	H(2)= 8.95; p<0.05; b*** c***
VOSP	1.0	(0.0, 1.0)	0.0	(-1.0, 0.0)	-1.3	(-2.5, 0.0)	H(2)= 12.13; p<0.005; b***
Picture Completion	1.0	(0.5, 1.3)	0.0	(-0.8, 0.2)	-1.0	(-1.5, -1.0)	H(2)= 21.98; p<0.001; a*** b*** c***
Rey Copy	-0.3	(-0.6, 0.3)	-0.16	(-2.5, 0.8)	-2.5	(-3.0, -1.0)	H(2)= 7.12; p<0.05; b***
Domain Score	**0.3**	**(-0.3, 0.6)**	**-0.7**	**(-0.9, -0.3)**	**-1.5**	**(-2.3, -0.8)**	**H(2)= 20.40; p<0.001; a*** b***
Language							
Boston Naming	0.8	(0.8, 0.9)	0.5	(-0.4, 0.8)	0.0	(-1.6, 0.6)	H(2)= 5.72; p= 0.056
ADAS-Cog-Language	0.3	(-0.7, 0.3)	-0.2	(-1.3, 0.3)	-1.7	(-2.7, -1.2)	H(2)= 13.43; p<0.001; b***
DRS-2 -Language	0.3	(-0.7, 0.3)	0.3	(-0.2, 0.3)	-1.3	(-2.2, -0.4)	H(2)= 8.65; p<0.01; b** c**
Domain Score	**1.8**	**(0.1, 0.3)**	**-0.3**	**(-0.6, 0.4)**	**-1.0**	**(-1.8, -0.7**	**H(2)= 18.38; p<0.001; b*** c***
Global Z Score	**0.1**	**(-0.2, 0.3)**	**-0.6**	**(-0.8, -0.4)**	**-1.9**	**(-2.1, -1.6)**	**H(2)= 26.37; p<0.001; a*** b*** c***

Note: Values are reported as median (Md), and the upper and lower bounds of the interquartile range (Lower quartile= Q_1; Upper quartile= Q_3). *Domain* z-scores for Attention, Working Memory and Processing Speed, Executive Function, Learning and Memory, Visuospatial functioning and Language are expressed as an aggregate score by averaging standardised scores from each measure per cognitive domain. *Global Cognition Z score* was expressed by an aggregate Z score by averaging standardised scores in five cognitive domains: Attention, Working Memory and Processing Speed, Executive Function, Learning and Memory, Visuospatial and Language. Analyses/Analysis of variance: Kruskal-Wallis. Post hoc pairwise comparison/Conover-Iman test between: a= PDN v PDMCI; b= PDN v PDD; c= PDMCI v PDD; * p< 0.05; ** p< 0.01; ***p<0.005.

3.3. Parkinson's disease characterised by the interRAI-HC

3.3.1. Outcome Measures of the interRAI-HC

Table 3-3 summarises the outcome measures of cognition (CPS), activities of daily living (ADL –Long Form; IADL Performance Scale; IADL Capacity Scale), depression (DRS), and pain in the interRAI-HC. There were no significant group differences observed on any of these measures, although the IADL Performance Scale and IADL Capacity Scale neared significance (p=0.06), reflecting median scores lower for PDN than PDMCI (Md=14.5, Md= 29.5), and PDMCI than PDD (Md=29.5, Md=33.5). There was a limited range of scores observed in measures of cognition (Md= 2.0; Q_1= 0.25; Q_3=2.0; score range of CPS is 0-6), activities of daily living (Md= 0.0; Q_1= 0.0; Q_3= 4.0; score range of ADL-Long form is 0-28), and depression (Md= 0.0; Q_1= 0.00; Q_3= 2.00; score range of DRS is 0-14).

Table 3-3

Clinical characteristics as assessed by the interRAI-HC Outcome Scales (n=31)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	Md	(Q_1, Q_3)	
CPS	1.0	(0.0, 2.0)	1.0	(0.0, 2.0)	2.0	(1.0, 2.0)	H(2)=2.70, p=0.22
Cognition total	1.0	(0.0, 1.0)	1.0	(0.0, 2.0)	2.0	(0.8, 3.0)	H(2)= 3.93, p= 0.12
ADL Long Form	0.0	(0.0, 2.8)	0.0	(0.0, 4.5)	0.0	(0.0, 4.0)	H(2)= 0.04, p=0.98
IADL Perform [d]	14.5	(8.0, 25.0)	29.5	(21.5, 41.0)	33.5	(29.0, 36.0)	H(2)= 5.71, p=0.06
IADL Capacity [d]	14.5	(6.0, 24.0)	30.5	(21.5, 40.5)	33.0	(29.0, 42.0)	H(2)=5.49, p=0.06
DRS	0.0	(0.0, 1.8)	0.0	(0.0, 2.0)	0.0	(0.0, 1.5)	H(2)=0.13, p=0.92
Pain	2.0	(0.0, 2.0)	1.0	(0.0, 2.0)	1.0	(0.0, 2.0)	H(2)= 0.73, p= 0.67

Note: [d] only MDS-HC NEW data available (n=16). Values are reported as median (Md), and the upper and lower bounds of the interquartile range (Lower quartile= Q_1; Upper quartile= Q_3). *Cognition:* CPS –Cognitive Performance Scale (0-6); Cognition Total Score was expressed as an aggregate score totalling the first 3 scores recorded in Section C: Cognition of the interRAI-HC (0-7; C1: Cognitive Skills for Daily Decision Making, C2a. Short term Memory and C2b. Procedural Memory). *Activities of Daily Living*: ADL Long Form –Activities of Daily Living –Long Form (0-28); IADL –Performance –Instrumental Activities of Daily Living –Performance (0-48); IADL –Capacity –Instrumental Activities of Daily Living –Capacity (0-48). *Mood and Psychiatric Symptoms*: DRS –Depression Rating Scale (0-14); *Clinical Symptoms*: Pain Scale (0-3). Analyses/Analysis of variance: Kruskal-Wallis.

Correlational analyses were used to measure the relationship between the CPS, the MMSE, MoCA and global cognition. The CPS has been validated against the MMSE (Morris et al., 1994) and equivalent scores between the two measures are noted in the literature (interRAI, 2013; Wellens et al., 2013). In this study, there was no significant association between the

MMSE and the CPS (r_s(29)= -0.32, p=0.08), the CPS and the MoCA (r_s(29)= -0.25, p=0.18) or the CPS and the global cognition z-score (r_s(29)= -0.05, p= 0.78).

See Figure 3-1, Figure 3-2 and Figure 3-3 for the pairwise scatterplots comparing the MMSE, MoCA and global cognition to the CPS. In Figure 3-1 a number of PDN patients were identified as "Mild" on the CPS, alongside PDD patients (see Appendix D**).** Also, the patient receiving the lowest score on the MMSE (20) and identified as PDD in this study, was identified on the CPS as cognitively "Intact". Distribution of scores comparing the CPS to the MoCA and global cognition show a similar trend, with a scatter of scores in the CPS across all groups, and a number of PDN receiving the same score as PDD on the CPS.

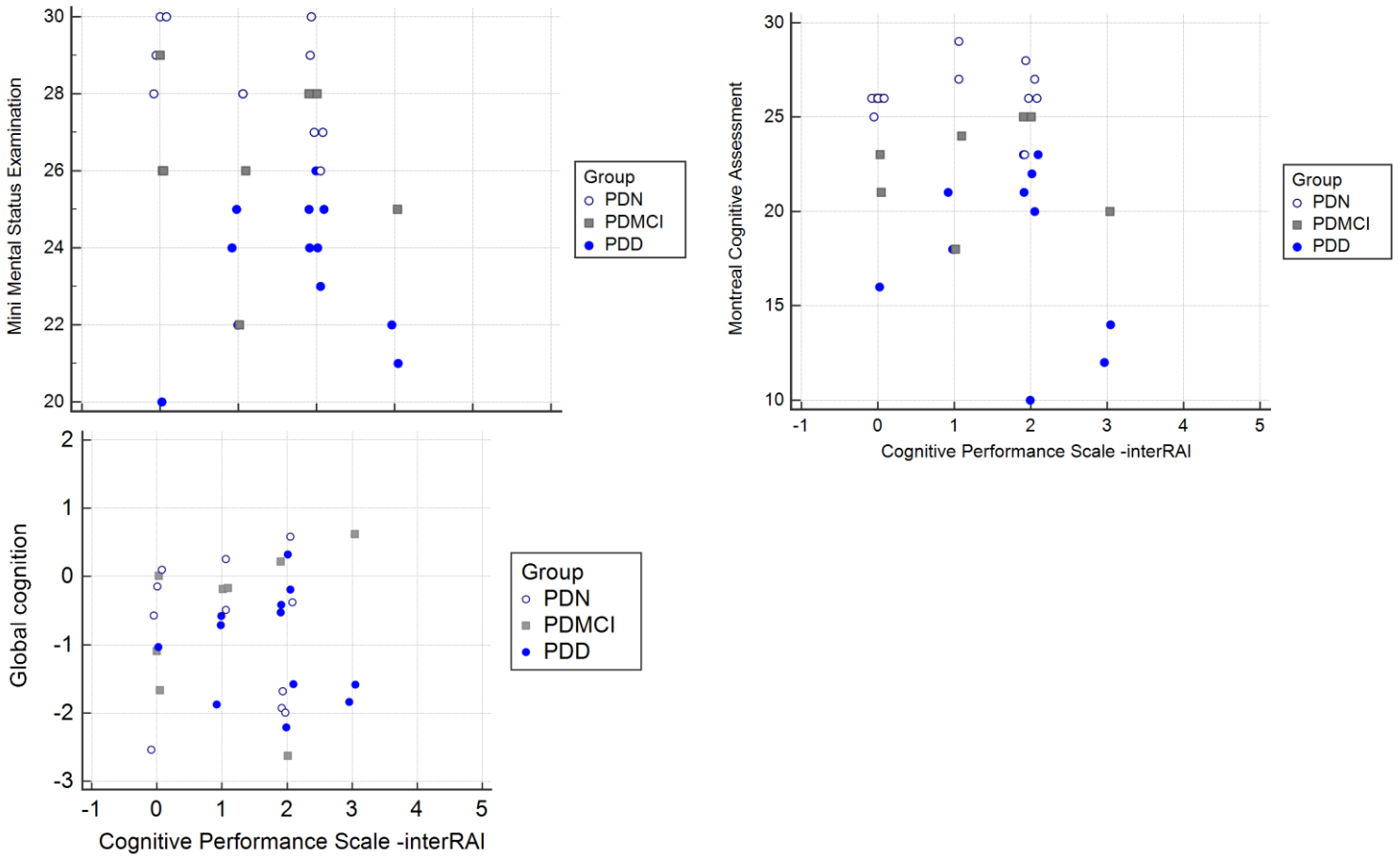
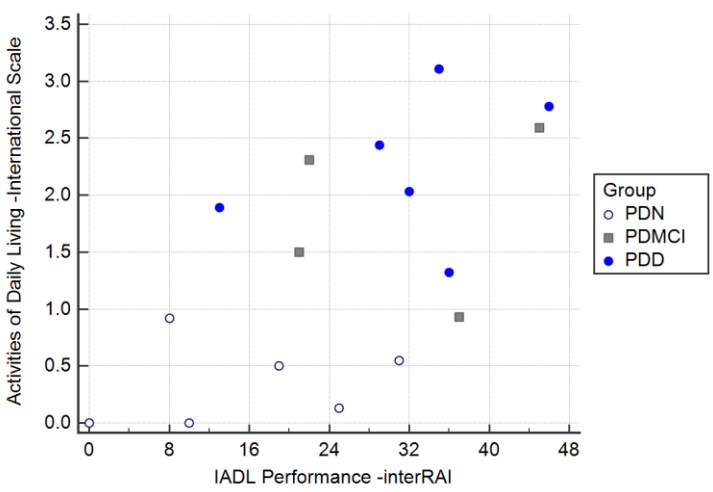


Figure 3-1, Figure 3-2, and Figure 3-3: **Association between the CPS and global measures of cognitive assessment**
Note: Interpretation of Cognitive Performance Scale: 0= "Intact", 1= "Borderline Intact", 1= "Mild", 2= "Moderate", 3= "Moderate", 4= "Moderate Severe", 5= "Severe", 6= "Very Severe"; CPS and MMSE equivalent scores: 0= 25, 1= 22, 2= 20, 3= 15, 4= 7, 5= 5, 6= 0.5; Legend: PDN= open circle; PDMCI= square; PDD= closed circle; Global cognition= Combined global cognition z score

As previous analyses of variance showed the IADL Performance measure and IADL Capacity measure each neared significance (p=0.06), additional analyses were completed to evaluate the association between these scales and similar measures of ADL. The IADL Performance Scale assesses an individual's ability to perform tasks related to independent functioning, while the IADL Capacity Scale is the presumed ability speculated by the assessor (interRAI, 2009).

Correlational analyses showed there was a significant correlation between both of these measures and the ADL-IS; the IADL Performance $r_s(14)= 0.63$; $p<0.01$ and IADL Capacity scale $r_s(14)= 0.64$, $p<0.01$. Figure 3-3 and Figure 3-4 show the pairwise scatterplots for IADL Performance and IADL Capacity as compared to the ADL-IS across groups. Trends in these graphs show a coherence between each IADL measure and the ADL-IS, with PDN scoring lower both on the IADL measure and ADL-IS, whilst the PDD group show increased impairment on both measures.



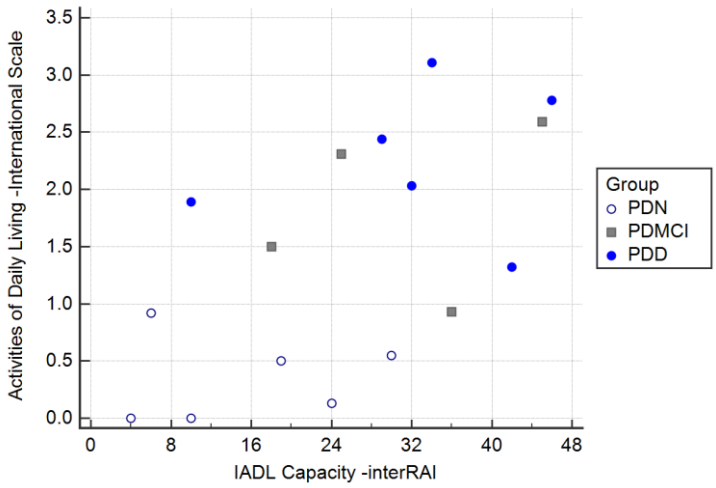


Figure 3- 4 and Figure 3-5: **Association between the IADL Performance Scale and the ADL-IS (p<0.01) and the IADL Capacity Scale and the ADL-IS (p<0.01)**
Note: Legend: PDN= open circle; PDMCI= square; PDD= closed circle

3.3.2. Individual items

3.3.2.1. Diagnoses, Continence and Health Conditions

Table 3-4 summarises the frequency of disease diagnoses, continence and health condition data for each group. Some 33 of the 34 participants in the study were accurately classified with a Parkinson's disease diagnosis, however only 6% of the sample were identified as having dementia other than AD. Of the two participants identified as having dementia by the interRAI-HC, one was classified as PDN by this study. PDN and PDMCI were completely bowel continent, and largely without difficulties with excessive amounts of sleep (PDN=88%; PDMCI= 100%). PDMCI however showed increased difficulty falling asleep (PDN= 88%; PDMCI= 50%), while PDN showed an increased level of pain. PDD patients had a significant increase in falls experienced in the last 90 days ($p<0.005$). They also experienced an increase in bladder incontinence (PDN= 50%; PDMCI= 22%; PDD= 69%) and difficulty getting up from a standing position (PDN= 38%; PDMCI= 50%; PDD= 67%), although this was not a significant different from other groups. All groups showed difficulty with unsteady gait (PDN= 88%; PDMCI= 100%; PDD= 100%) and fatigue (PDN= 88%; PDMCI= 100%; PDD= 83%).

Table 3-4

Items measuring disease diagnosis, continence and health in the interRAI-HC (n=34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	n	(%)	n	(%)	n	(%)	
Section I: Disease diagnosis							
Parkinson's disease	11	(91.7)	9	(100.0)	13	(100.0)	
Dementia other than AD	1	(8.3)	0	(0.0)	1	(7.7)	
Anxiety	2	(16.7)	0	(0.0)	1	(7.7)	
Depression	3	(25.0)	1	(11.1)	0	(0.0)	
Schizophrenia	0	(0.0)	0	(0.0)	0	(0.0)	
Section H: Continence							
Bladder Continence							
Continent	6	(50.0)	7	(77.9)	4	(30.7)	p= 0.12
Not Continent	6	(50.0)	2	(22.2)	9	(69.3)	
Bowel Continence							
Continent	12	(100.0)	9	(100.0)	11	(84.6)	p= 0.32
Not Continent	0	(0.0)	0	(0.0)	2	(15.4)	
Section J: Health Conditions							
Experienced falls in the last 90 days							
No Fall	7	(58.3)	8	(88.9)	2	(15.4)	p<0.005
Falls	5	(41.7)	1	(11.1)	11	(84.6)	b* c***
Difficult or unable to move self to standing position unassisted [d]							
Not present	5	(62.5)	1	(50.0)	2	(33.3)	p=0.78
Exhibited in the last 3 days	3	(37.5)	1	(50.0)	4	(66.7)	
Unsteady gait [d]							
Not present	1	(12.5)	0	(0.0)	0	(0.0)	p= 1.00
Exhibited daily last 3 days	7	(87.5)	2	(100.0)	6	(100.0)	
Difficulty falling asleep; non-restful sleep							
Not present	7	(87.5)	1	(50.0)	3	(50.0)	p= 0.24
Exhibited daily last 3 days	1	(12.5)	1	(50.0)	3	(50.0)	
Excessive amounts of sleep							
Not present	7	(87.5)	2	(100.0)	5	(83.3)	p= 1.00
Exhibited daily last 3 days	1	(12.5)	0	(0.0)	1	(16.7)	
Fatigue [d]							
Not present	1	(12.5)	0	(0.0)	1	(16.7)	p= 1.00
Exhibited in the last 3 days	7	(87.5)	2	(100.0)	5	(83.3)	
Intensity of pain							
No pain	4	(33.3)	4	(44.4)	5	(38.5)	p= 0.69
Mild	0	(0.0)	1	(11.1)	3	(23.1)	
Moderate	5	(41.7)	4	(44.4)	4	(30.7)	
Severe	2	(16.7)	0	(0.0)	1	(7.7)	
Excruciating	1	(8.3)	0	(0.0)	0	(0.0)	

Note: [d] only MDS-HC NEW data available (n=16). Post hoc comparison using Fisher's Exact between: a= PDN v PDMCI; b= PDN v PDD; c= PDMCI v PDD; * p< 0.05; ** p< 0.01; ***p<0.005

The interRAI-HC measures of falls experienced in the last 90 days was compared to the ADL-IS, the MoCA and global cognition presented in Figure 3-5 and Figure 3-6. There was no significant difference between falls in experienced in the last 90 days and the ADL-IS ($t(32)= -1.62$, $p= 0.11$) or the MoCA ($t(32)= 2.03$, $p=0.05$). However there was a significant difference between falls experienced in the last 90 days and global cognition ($t(32)=2.73$, $p<0.05$). These results indicate that those who experienced a fall also received a lower global cognition z-score than those who has not fallen in the last 90 days. Although this difference was not statistically significant for scores on the ADL-IS or the MoCA, there is a similar trend from the scatterplots which show those who experienced falls also tended to exhibit increased impairment.

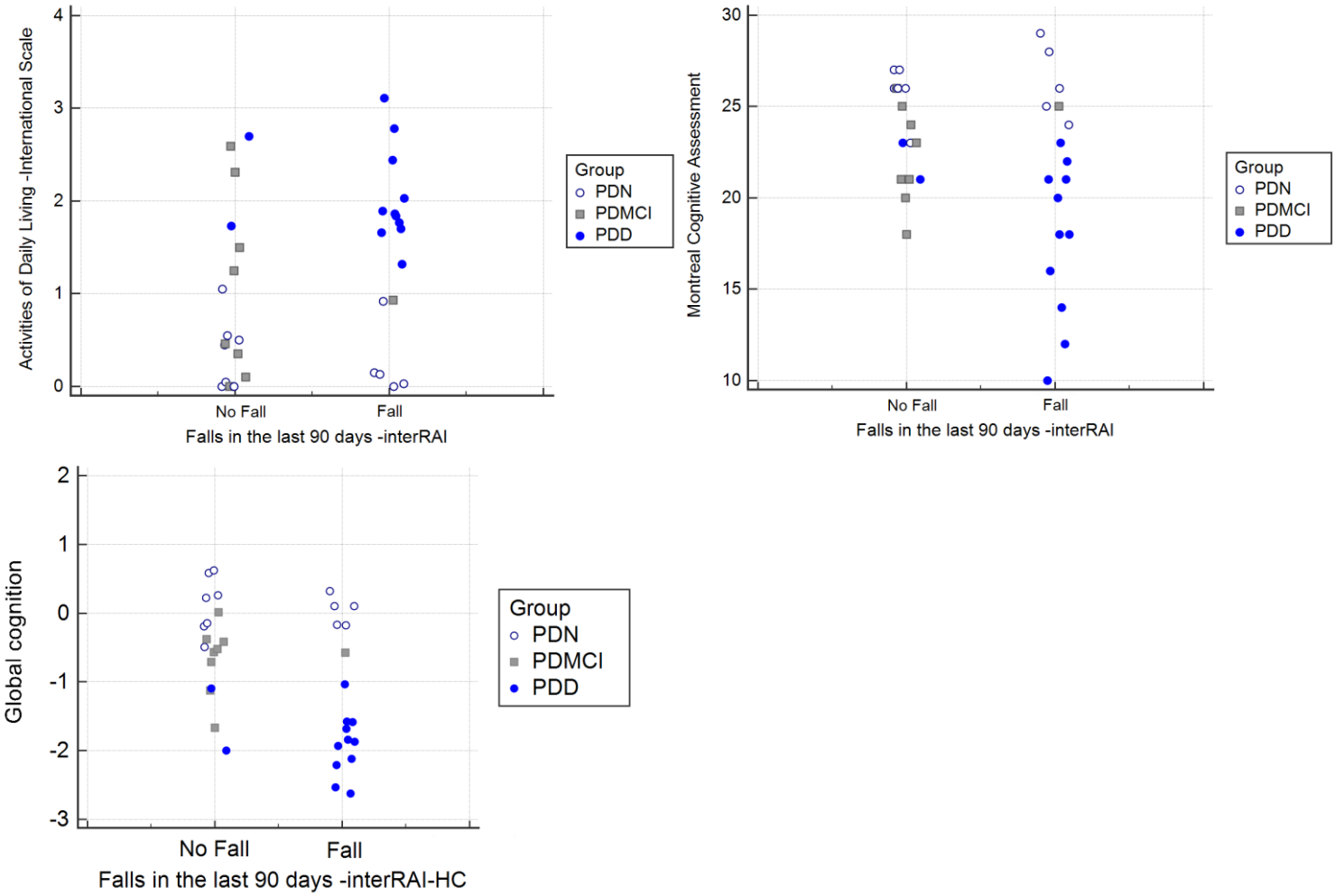


***Figure 3-6, Figure 3-7 and Figure 3-8*: Association between falls experienced in the last 90 days and ADL-IS, the MoCA, and global cognition**

Note: *Legend: PDN= open circle; PDMCI= square; PDD= closed circle;* Global cognition= Combined global cognition z-score

3.3.2.2. Cognition

As no group differences were observed in the outcome measures of cognition from the interRAI-HC, item-by-item analyses of Section C: Cognition were completed and are summarised in Table 3-5. The majority of PDN and PDMCI participants tended to be described as “Independent” in cognitive skills needed for daily decision making (67% and 78% respectfully) alongside 62% of PDD. All of PDN and PDMCI participants were identified as having “Okay” situational memory, along with 83% of those with PDD. A number of PDMCI and PDD participants both indicated a noticeable change in their decision making ability in the last 90 days (PDMCI=89%; PDD= 62%) compared to PDN (33%), and less PDMCI and PDD reported an ability to understand others (PDMCI=67%; PDD= 69%) compared to PDN (92%). A significant group difference was seen in the measure of procedural memory ($p<0.05$), with all PDN participants indicating no problem with procedural memory compared to 39% of PDD (post hoc analysis: PDN v PDD= $p<0.01$).

Table 3-5

Items measuring cognitive symptoms in the interRAI-HC (n= 34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	n	%	n	%	n	%	
Section C: Cognition							
Cognitive Skills for Daily Decision Making							
Independent	8	(66.7)	7	(77.8)	8	(61.5)	p=0.30
Modified independence	3	(25.0)	1	(11.1)	1	(7.7)	
Minimally impaired	1	(8.3)	0	(0.0)	4	(30.8)	
Moderately impaired	0	(0.0)	1	(11.1)	0	(0.0)	
Severely impaired	0	(0.0)	0	(0.0)	0	(0.0)	
Short Term Memory							
Memory Okay	8	(66.7)	4	(44.4)	3	(23.1)	p= 0.10
Memory problem	4	(33.3)	5	(55.6)	10	(76.9)	
Procedural Memory							
Memory Okay	12	(100.0)	7	(77.8)	8	(61.5)	p<0.05
Memory problem	0	(0.0)	2	(22.2)	5	(38.5)	b**
Situational Memory [d]							
Memory Okay	8	(100.0)	2	(100.0)	5	(83.3)	p= 0.50
Memory problem	0	(0.0)	0	(0.0)	1	(16.7)	
Change in decision making in 90 days							
Change	4	(33.3)	8	(88.9)	8	(61.5)	p= 0.07
No change	7	(58.3)	1	(11.1)	5	(38.5)	
Uncertain	1	(8.3)	0	(0.0)	0	(0.0)	

Making self-understood (Expression)							
Understood	7	(58.3)	6	(66.7)	7	(53.9)	p= 0.74
Usually understood	5	(41.7)	2	(22.2)	4	(30.8)	
Often understood	0	(0.0)	1	(11.1)	2	(15.4)	
Sometimes understood	0	(0.0)	0	(0.0)	0	(0.0)	
Rarely understood	0	(0.0)	0	(0.0)	0	(0.0)	
Ability to understand others (Comprehension)							
Understands	11	(91.7)	6	(66.7)	9	(69.2)	p= 0.56
Usually understands	1	(8.3)	2	(22.2)	2	(15.4)	
Often understands	0	(0.0)	1	(11.1)	2	(15.4)	
Sometimes understands	0	(0.0)	0	(0.0)	0	(0.0)	
Rarely understands	0	(0.0)	0	(0.0)	0	(0.0)	

Note: [d] only MDS-HC NEW data available (n=16). Post hoc comparison using Fisher's Exact between: a= PDN v PDMCI; b= PDN v PDD; c= PDMCI v PDD; * p< 0.05; ** p< 0.01; ***p<0.005

Correlational analyses were completed to investigate whether cognitive skills for daily decision making (Section C: 1.), short-term memory (Section C; 2a.) and procedural memory (Section C: 2b.) in the interRAI-HC were significantly associated with similar measures.

Cognitive skills for decision making is operationalised as a person's ability to make decisions of daily living, such as planning and organisation (interRAI, 2009). Scores from this item were compared to the combined z-score for executive functioning (Figure 3-7) and the global cognition z-score (Figure 3-8). Correlational analyses showed there was not a significant association between cognitive skills for decision making and executive functioning ($r_s(32)= -0.17$, p=0.34) or with global functioning ($r_s(32)= -0.11$, p=0.52). Due to the ambiguity of definition for this construct, an additional analysis was conducted with the ADL-IS. There was however, no significant association detected ($r_s(32)= 0.23$, p=0.20).

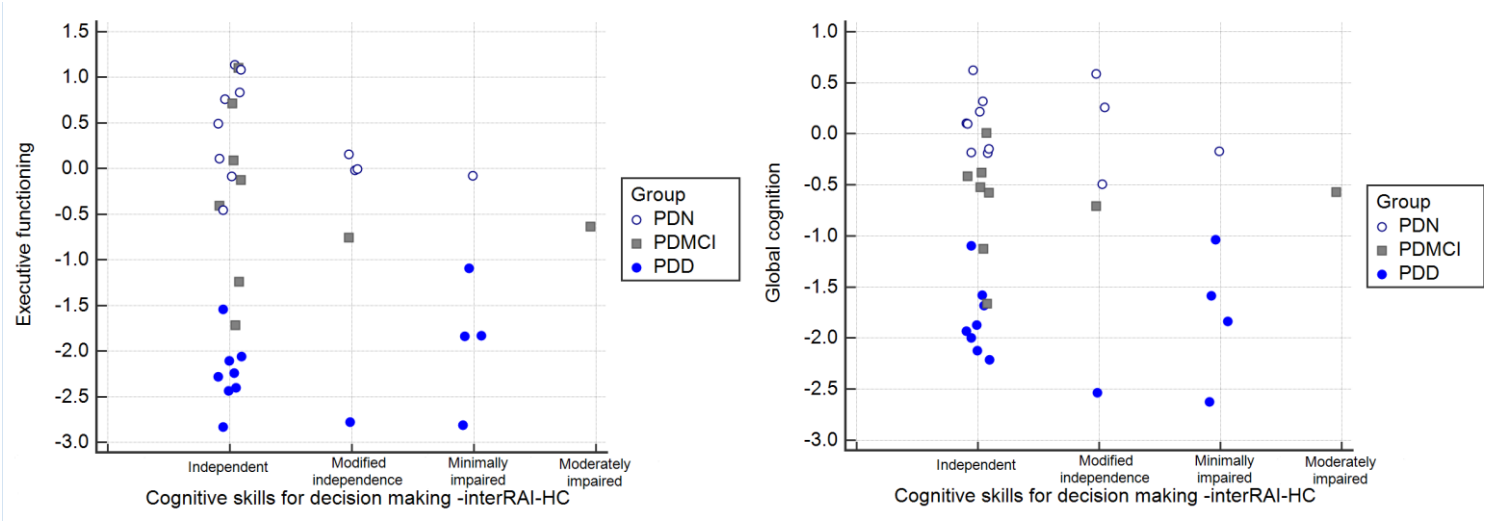


***Figure 3-9 and Figure 3-10*: Association between cognitive skills for decision making and executive functioning, and global cognition**

Note: Legend: PDN= open circle; PDMCI= square; PDD= closed circle; Executive Functioning= Executive functioning combined z-score; Global cognition= Combined global cognition z-score

Short term memory in the interRAI-HC is defined as recall after five minutes, and although examples are given, no standardised method of assessment is operationalised (interRAI-HC, 2009). The item of short term memory was compared to the combined z-score of learning and memory (Figure 3-9) and the global cognitive z-score (Figure 3-10). An independent sample t-test observed a significant difference of short-term memory on the interRAI-HC with learning and memory ($r(32)= -0.43$; $p<0.05$). Similarly, there was a significant difference of short-term memory and global cognition ($r(32)= -0.39$; $p<0.05$). This result indicates that those who had a problem of short-term memory received lower scores in both the learning and memory domain, and global cognition domain, than those who were not identified as having a short-term memory problem.

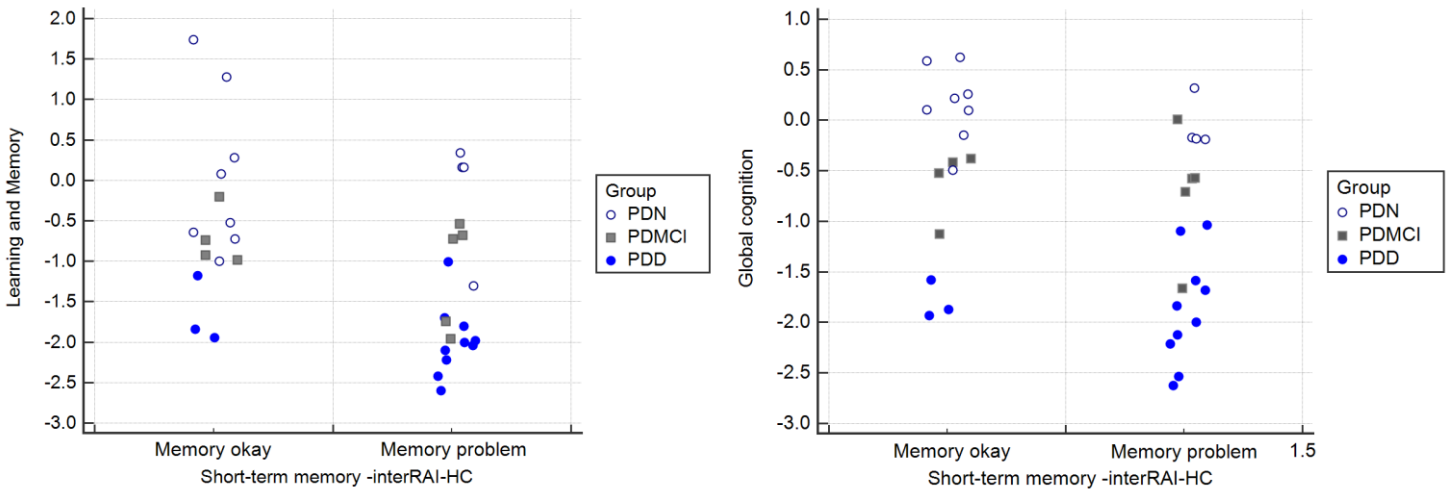


***Figure 3-11 and Figure 3-12*: Association between short term memory and learning and memory, and global cognition**

Note: Legend: PDN= open circle; PDMCI= square; PDD= closed circle; Learning and Memory= Learning and Memory combined z-score; Global cognition= Combined global cognition z-score

Procedural memory is measured in the interRAI-HC as the cognitive ability to perform sequential activities and recall one step in order to perform the next step (interRAI, 2009). Scores of procedural memory were compared to the combined z-score for attention and working memory (Figure 3-11) and the global cognition z-score (Figure 3-12). The interRAI-HC identified all PDN participants as possessing intact procedural memory. However 62% of PDD patients were also classified as unimpaired, with several participants showing scores 2SD below normal range. A t-test of independent samples showed there was no significant difference of procedural memory associated with attention and memory ($t(32)= -1.83$, $p=0.8$), but a significant difference between procedural memory and global cognition ($r(32)= -0.35$; $p<0.05$). This result shows that those who indicate having a problem of procedural memory also scored lower in global cognition, as compared to those whose procedural memory was "okay". But this difference was not seen in scores of attention and memory.

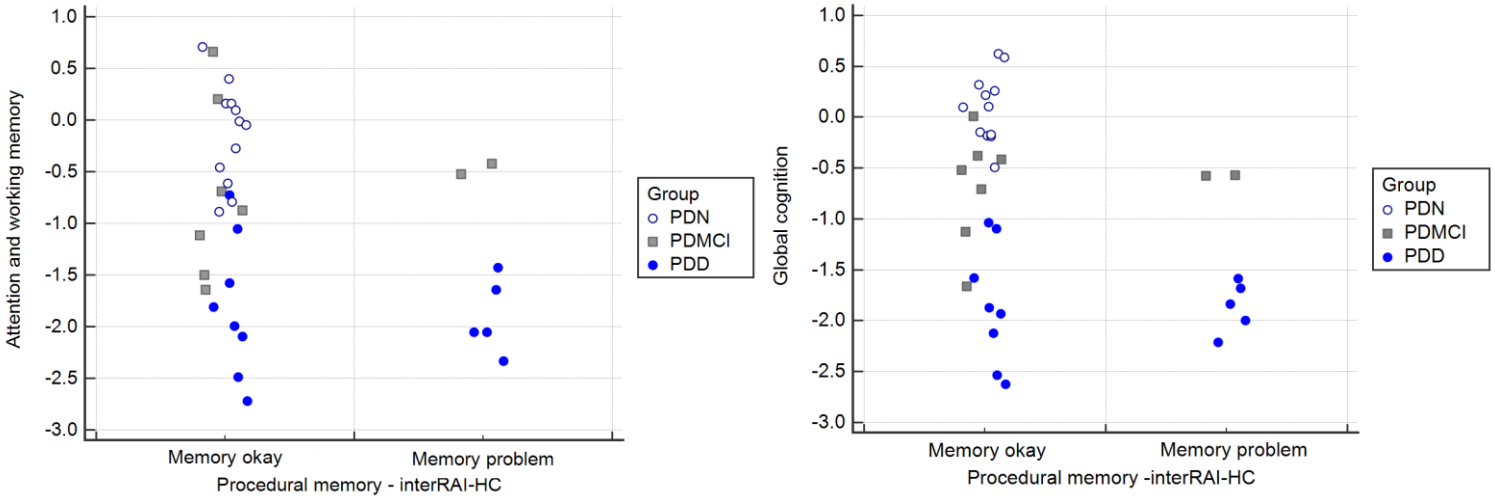


***Figure 3-13 and Figure 3-14*: Association between short term memory and learning and memory, and global cognition z-scores**

Note: Legend: PDN= open circle; PDMCI= square; PDD= closed circle; Attention and Memory= Attention and Memory combined z-score; Global cognition= Combined global cognition z-score

3.3.2.3. Functional Independence –ADLs and IADLs

As previous noted, significant group differences were not observed between the interRAI-HC outcome measures of ADL (ADL Long Form) or IADL (IADL Performance, IADL Capacity). Similarly no significant differences were seen after tests of independence on individual items of Section G: Functional status in the interRAI-HC.

Table 3-6 summarises the frequency of IADL performance for each group. More PDD participants required assistance with meal preparation (85%), managing medications (69%), and using the telephone (31%) as compared to PDN (42%, 33%, and 17% respectively). That said, both PDD and PDN required assistance managing finances (77% and 67%), and similar need was seen across groups for shopping (PDN= 50%, PDMCI=67%, PDD=69%) and using the stairs (PDN= 42%, PDMCI, 44%, PDD= 54%). Increased frequency of assistance was indicated for PDN as compared to PDMCI and PDD for transportation (25%, 44%, and 69%).

Table 3-6

Items measuring performance of instrumental activities of daily living in the interRAI-HC (n= 34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	n	(%)	n	(%)	n	(%)	
Section G: Functional Status							
IADL Self-Performance							
Meal Preparation							
Independent	5	(41.7)	3	(33.3)	1	(7.7)	p= 0.15
Assistance	5	(41.7)	6	(66.7)	11	(84.6)	
Did not occur	2	(16.6)	0	(0.0)	1	(7.7)	
Ordinary Housework							
Independent	2	(16.7)	1	(11.1)	1	(7.7)	p= 1.00
Assistance	10	(83.3)	8	(88.9)	11	(84.6)	
Did not occur	0	0.00	0	(0.0)	1	(7.7)	
Managing Finances							
Independent	4	(33.3)	5	(55.6)	2	(15.4)	p= 0.21
Assistance	8	(66.7)	4	(44.4)	10	(76.9)	
Did not occur	0	(0.0)	0	(0.0)	1	(7.7)	
Managing Medications							
Independent	8	(66.7)	6	(66.7)	4	(30.8)	p= 0.13
Assistance	4	(33.3)	3	(33.3)	9	(69.2)	
Phone Use							
Independent	10	(83.3)	8	(88.9)	9	(69.2)	p= 0.57
Assistance	2	(16.7)	1	(11.1)	4	(30.8)	
Stairs							
Independent	4	(33.3)	4	(44.4)	2	(15.4)	p= 0.65
Assistance	5	(41.7)	4	(44.4)	7	(53.9)	
Did not occur	3	(25.0)	1	(11.1)	4	(30.8)	
Shopping							
Independent	6	(50.0)	3	(33.3)	3	(23.1)	P= 0.55
Assistance	6	(50.0)	6	(66.7)	9	(69.2)	
Did not occur	0	(0.0)	0	(0.0)	1	(7.7)	
Transportation							
Independent	8	(66.7)	5	(55.6)	3	(23.1)	p= 0.12
Assistance	3	(25.0)	4	(44.4)	9	(69.2)	
Did not occur	1	(8.3)	0	(0.0)	1	(7.7)	

Note: [d] only MDS-HC NEW data available (n=16). *Analyses*: Fisher's Exact.

Table 3-7 summarises frequency of performance of ADLs for each group. All of the PDD group indicated they can walk independently, compared to 50% of PDN and PDMCI. All of the PDD sample also identified independent locomotion, compared to 50% of PDMCI and 63% of PDN. Difficulty with toilet use (PDN= 25%, PDMCI, 11%, PDD= 23%), bed mobility (PDN= 25%, PDMCI= 22%, PDD= 15%) and eating (PDN= 0%, PDMCI= 11%, PDD= 7%) were similar across groups. However PDMCI and PDD required more assistance bathing (67%, 54%) than PDN (33%).

Table 3-7

Items measuring performance of activities of daily living in the interRAI-HC (n= 34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	n	%	n	%	n	%	
Section G: Functional Status							
ADL self-performance							
Bathing							
Independent	8	(66.7)	3	(33.3)	6	(46.2)	p= 0.32
Assistance	4	(33.3)	6	(66.7)	7	(53.8)	
Personal Hygiene							
Independent	8	(66.7)	7	(77.8)	8	(61.5)	p= 0.81
Assistance	4	(33.3)	2	(22.2)	5	(38.5)	
Dressing Upper Body							
Independent	8	(66.7)	6	(66.7)	7	(53.8)	p= 0.82
Assistance	4	(33.3)	3	(33.3)	6	(46.2)	
Dressing Lower Body							
Independent	8	(66.7)	6	(66.7)	6	(46.2)	p= 0.56
Assistance	4	(33.3)	3	(33.3)	7	(53.8)	
Walking [d]							
Independent	4	(50.0)	1	(50.0)	6	(100.0)	p= 0.13
Assistance	4	(50.0)	1	(50.0)	0	(0.0)	
Locomotion [d]							
Independent	5	(62.5)	1	(50.0)	6	(100.0)	p= 0.18
Assistance	3	(37.5)	1	(50.0)	0	(0.0)	
Transfer Toilet							
Independent	6	(75.0)	1	(50.0)	5	(83.3)	p= 0.77
Assistance	2	(25.0)	1	(50.0)	1	(16.7)	
Toilet Use							
Independent	9	(75.0)	8	(88.9)	10	(76.9)	p= 0.76
Assistance	3	(25.0)	1	(11.1)	3	(23.1)	
Bed Mobility							
Independent	9	(75.0)	7	(77.8)	11	(84.6)	p= 0.87
Assistance	3	(25.0)	2	(22.2)	2	(15.4)	
Eating							
Independent	12	(100.0)	8	(88.9)	12	(92.3)	p= 0.722
Assistance	0	(0.0)	1	(11.1)	1	(7.7)	

Note: [d] only MDS-HC NEW data available (n=16). *Analyses*: Fisher's Exact.

3.3.2.4. Neuropsychiatric symptoms

As previous noted, significant group differences were not observed between the interRAI-HC outcome measures of depression (DRS). Similarly there were no significant differences of abnormal thought processes, delusions or hallucinations across groups, or from item-by-item analysis of other neuropsychiatric symptoms in the interRAI-HC (Table 3-8). Those with PDD reported persistent anger with themselves or others (15%), unrealistic fears (8%), and repetitive health complaints (8%) compared with no individuals with PDN or PDMCI. While 25% of those with PDN expressed anhedonia (reduced feelings of pleasure) compared to no PDMCI or PDD participants.

Table 3-8

Items measuring neuropsychiatric symptoms, mood, and behaviour in the interRAI-HC (n=34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	n	%	n	%	n	%	
Section J: Health Conditions							
Abnormal thought process [d]							
Present	1	(12.5)	0	(0.0)	1	(16.7)	p= 1.00
Not present	7	(87.5)	2	(100.0)	5	(83.3)	
Delusions [d]							
Present	1	(12.5)	1	(50.0)	1	(16.7)	p= 0.49
Not present	7	(87.5)	1	(50.0)	5	(83.3)	
Hallucinations [d]							
Present	1	(12.5)	1	(50.0)	2	(33.3)	p= 0.40
Not present	7	(87.5)	1	(50.0)	4	(66.7)	
Section E: Mood and Behaviour							
Made negative statements							
Present	1	(8.3)	0	(0.0)	2	(15.4)	p= 0.77
Not present	11	(91.7)	9	(100.0)	11	(84.6)	
Persistent anger with self or others							
Present	0	(0.0)	0	(0.0)	2	(15.4)	p= 0.32
Not present	12	(100.0)	9	(100.0)	11	(84.6)	
Expression of unrealistic fears							
Present	0	(0.0)	0	(0.0)	1	(7.7)	p= 1.00
Not present	12	(100.0)	9	(100.0)	12	(92.3)	
Repetitive health complaints							
Present	0	(0.0)	0	(0.0)	1	(7.7)	p= 1.00
Not present	12	(100.0)	9	(100.0)	12	(92.3)	
Repetitive anxious concerns							
Present	1	(8.3)	1	(11.1)	1	(7.7)	p= 1.00
Not present	11	(91.7)	8	(88.9)	12	(92.3)	
Sad, pained, worried facial expressions							
Present	4	(33.3)	3	(33.3)	2	(15.4)	p= 0.62
Not present	8	(66.7)	6	(66.7)	11	(84.6)	
Crying and tearfulness							
Present	2	(16.7)	0	(0.0)	1	(7.7)	p= 0.61
Not present	10	(83.3)	9	(100.0)	12	(92.3)	
Recurrent statements something bad is going to happen [d]							
Present	0	(0.0)	0	(0.0)	0	(0.0)	p= 1.00
Not present	8	(100.0)	2	(100.0)	6	(100.0)	
Withdrawal from activities of interest							
Present	1	(8.3)	0	(0.0)	2	(15.4)	p= 0.77
Not present	11	(91.7)	9	(100.0)	11	(34.6)	
Reduced social interaction							
Present	2	)16.7)	1	(11.1)	2	(15.4)	p= 1.00
Not present	10	(83.3)	8	(88.9)	11	(34.6)	
Expressions of anhedonia [d]							
Present	2	(25.0)	0	(0.0)	0	(0.0)	p= 0.60
Not present	6	(75.0)	2	(100.0)	6	(100.0)	

Note: [d] only MDS-HC NEW data available (n=16). *Analyses*: Fisher's Exact.

3.3.2.5. Additional non-motor symptoms and health indicators

Additional items within the interRAI-HC were selected in order to explore other non-motor symptoms for this sample which may relate to cognitive status and disease pathology. There were no significant differences between groups observed in hearing, vision, loneliness or self-reported health. That said, more individuals with PDMCI reported “Excellent” health (78%), as compared to PDN (33%) and PDD (46%). Those with PDD also reported increased carer distress (15%), carer feeling overwhelmed (15%), and career being unable to continue (15%), than PDN participants (0%, 8%, 0% respectively) or PDMCI (0%, 0%, 11% respectively). There were no significant differences detected in assessed elements of social support, with similar frequencies of informal helper/caregivers across groups, and experiences of those caregivers.

Table 3-9

Additional items measuring non-motor symptoms and health in the interRAI-HC (n= 34)

	PDN (n = 12)		PDMCI (n= 9)		PDD (n= 13)		Analyses
	n	%	n	%	n	%	
Section D: Communication and Vision							
Hearing							
Adequate	5	(41.7)	7	(77.8)	10	(76.9)	p= 0.14
Impaired	7	(58.3)	2	(22.2)	3	(23.1)	
Vision							
Adequate	11	(91.7)	9	(100.0)	10	(76.9)	p= 0.42
Impaired	1	(8.3)	0	(0.0)	3	(23.1)	
Section F: Psychosocial Well-being							
Lonely							
Yes	1	(8.3)	0	(0.0)	3	(23.1)	p= 0.42
No	11	(91.7)	9	(100.0)	10	(76.9)	
Section J: Health Conditions							
Self-Reported Health							
Excellent	4	(33.3)	7	(77.8)	6	(46.1)	p= 0.18
Good	4	(33.3)	0	(0.0)	3	(23.1)	
Fair	4	(33.3)	1	(11.1)	4	(30.8)	
Poor	0	(0.0)	1	(11.1)	0	(0.0)	
Section P: Social Supports							
Informal Helper/Caregiver							
Yes	11	(91.7)	6	(66.7)	10	(76.9)	p= 0.37
No	1	(8.3)	3	(33.3)	3	(23.1)	
Informal carer unable to continue care due to own health difficulties							
Yes	0	(0.0)	1	(11.1)	2	(15.4)	p= 47
No	12	(100.0)	8	(88.9)	11	(84.6)	
Informal carer expresses distress, anger, or depression							
Yes	0	(0.0)	0	(0.0)	2	(15.4)	p= 0.32
No	12	(100.0)	9	(100.0)	11	(84.6)	
Informal carer reports being overwhelmed by level of need							
Yes	1	(8.3)	0	(0.0)	2	(15.4)	p= 0.77
No	11	(91.7)	9	(100.0)	11	(84.6)	

Note: [d] only MDS-HC NEW data available (n=16). *Analyses*: Fisher's Exact.

3.4. Testing proximity and interRAI-HC format

Additional analyses were completed to examine the impact of time between detailed neuropsychological testing and the interRAI-HC, and the different versions of the interRAI-HC form that were collected in this study.

As there were <183 days between each testing condition, it is important to ascertain whether possible cognitive decline over this time period impacted these results. Analysis of variance showed no significant group differences in days between tests (H(2)=3.34, p= 0.19) and there was no significant association between testing proximity and global cognition z-score (r_s(32)= -0.28, p= 0.11). See Figure 3-9 for the pairwise scatterplot of time between testing and the global z-score. A t-test of independent means was also completed to analyse whether having completed the interRAI-HC before or after detailed neuropsychological testing had an impact on global cognition z-score, which resulted in no significant differences (t(32)= 0.71, p=0.48).

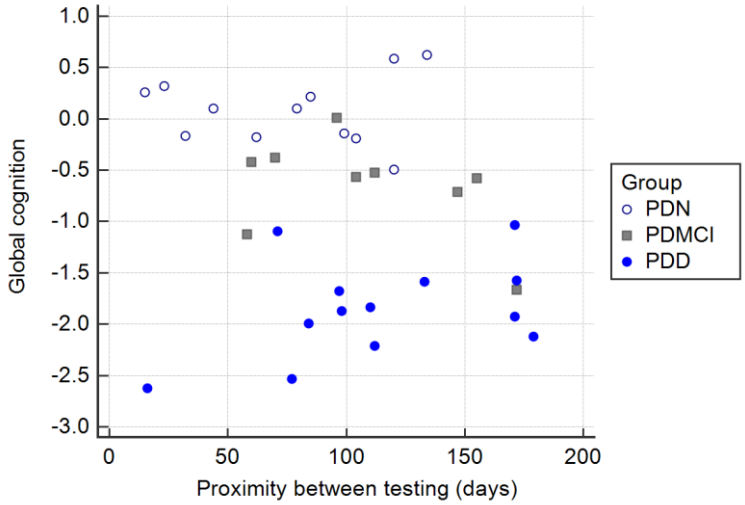


Figure 3-14: **Association of days between testing conditions and global cognition z-score**
Note: Legend: PDN= open circle; PDMCI= square; PDD= closed circle; Global cognition= Combined global cognition z-score

A t-test of independent means was also completed to explore whether there was a difference in scores of cognition between the two forms of the interRAI-HC collected in this study (MDS-HC version 2.0 and interRAI-HC version 9.1). There was no significant difference in scores of the MDS-HC and the interRAI-HC on the CPS (t(29)=0.24, p=0.81), cognition in daily decision making (t(29)= 0.12, p=91), short term memory (t(29)=0.21, p=0.84) or procedural memory (t(29)= -0.32, p=0.75).

4. Discussion

This research compared the characterisation of cognitive functioning, motor symptoms and non-motor symptoms in PD by the interRAI-HC with a battery of detailed neuropsychological tests. Participants in this study were classified by cognitive status using current MDS criteria to evaluate whether the interRAI-HC could identify differences of functioning between these groups, to reflect the differences of need indicated by research and seen in the community. This comparison also provided preliminary evaluation of the external validity of some corresponding interRAI-HC measures in the assessment of PD.

As anticipated, characterisation of PD by detailed neuropsychological testing produced clear group differences of cognition, motor symptoms and non-motor symptom profile, which reflected expectations outlined in research. Results showed a clear progression of cognitive decline and functional independence between PDN and PDD, with PDMCI often identified as an intermediary stage of impairment. PDD exhibited worse performance compared to PDN on all but two neuropsychological tests (of which there were no significant differences), with particular impairment seen in tasks of executive functioning, attention and working memory, and learning and memory. Dementia in PD has been described as a cognitive profile of pronounced executive dysfunction (Emre et al., 2007) secondary to attention and memory deficits (Noe et al., 2004); this is reflected in the characterisation of neuropsychological tests for this sample. Additionally, those with PDD also showed increased motor symptoms compared to both PDN and PDMCI, however PDN and PDMCI did not differ. In this way, although PDMCI acted as an intermediary stage of decline for cognition and activities of daily living for this sample, PDMCI appeared to be less impacted by motor symptom burden in this sample.

In the interRAI-HC, one participant failed to be identified with a diagnosis of PD, while 12 PDD participants were not recognised as having dementia other than AD. This result is of interest, as the presence of disease diagnoses within this instrument will indicate the level of care needed and the type of intervention required for that individual (Morris et al., 2009).

Nearly every participant of each group reported difficulties with excessive fatigue and unsteady gait, which would be expected from the literature. There was also a statistically significant difference between groups in falls experienced in the last 90 days. In addition, those who experienced falls showed greater impairment on the global cognition z-score, which was statistically different from those who had not experienced falls. This result is of interest as the measurement of falls and fall risk was not included in the neuropsychological battery, and appears relevant to developing cognitive impairment in this population.

In contrast to global measures in the neuropsychological battery, none of the outcome measures in the interRAI-HC were seen to significantly distinguish group differences in this sample. Despite these results, there are trends of agreement the characterisation of this sample by the interRAI-HC and neuropsychological testing. For example, PDD participants exhibited worse cognition than PDN and PDMCI on the CPS, short-term memory and procedural memory. Although this pattern was not significant on the CPS or short-term memory, the measure of procedural memory was able to significantly differentiate PDN from PDD, reflecting a similar pattern to neuropsychological testing and the expected profile from research. In contract to expectations, the item assessing “cognitive skills for daily decision making” identified almost as many PDD participants (62%) as PDN (67%) participants as cognitively “Independent”. In addition, this item did not significantly correlate with other measures of executive functioning, global cognition or the ADL-IS. This result is of interest, as this item is used to form the final score of the CPS and may have contributed to the inability of the CPS to identify significant group differences.

The CPS has been validated against the MMSE (Morris et al., 1994) and equivalent scores have been reported in the literature (Wellens et al., 2013). In this study, there was no significant association between the CPS and the MMSE, nor was an association seen between the CPS and the MoCA, or global cognition z-score. This result is of particular interest as agreement between the CPS and the MMSE would be expected. In addition, the

CPS failed to identify one PDD participant labelling him as cognitively “Intact”, despite him also receiving the lowest score on the MMSE (20).

Similarly, there were mixed results in the characterisation of activities of daily living by the interRAI-HC. The ADL –Long Form showed little variance in scores across groups and identified all groups as “Independent” in the performance of activities of daily living (median score of zero for all groups, out of a total score of 48). This trend was not seen in neuropsychological testing, which saw a significant decline in functioning from PDN to PDMCI, and subsequently to PDD. However, this progressive decline of functional independence across groups was seen in interRAI-HC measures of IADL. In addition, both the IADL Performance Scale and the IADL Capacity Scale showed a significant relationship with the neuropsychological measure of activities of daily living (ADL-IS). This result is of particular promise, as it shows convergent validity between these measures despite a very small sample (interRAI-HC version 9.1. data only; n=16).

Although group differences were indicated in the NPI, no group differences of abnormal thoughts, delusions or hallucinations were identified in the interRAI-HC. In addition, results from neither the interRAI-HC nor neuropsychological battery identified group differences in depression or anxiety, or indicated mood disturbances out of the normal range. Although depression is common in PD, it is complicated to assess as many features such as fatigue, psychomotor slowing, muted facial expression and flatted affect can also be manifestation of PD pathology (Pandya, Kubu and Giroux, 2008).

4.1. Limitations and Future Directions

Although this is an important initial exploratory study into the characterisation of PD by the interRAI-HC, there are several limitations to consider. Several measures in the interRAI-HC reflected trends which were expected from research and similar to the results seen in the neuropsychological battery, however very few interRAI-HC measures identified significant differences across groups. In this way, for this sample the interRAI-HC outcome measures fail to “evaluate an individual’s current clinical status as compared to gold measure

standards" (Morris et al., 2000). However due to the small sample size in this study, it is important to recognise these trends and results as preliminary indicators for PD in New Zealand.

Another limitation is the proximity of each testing condition, and the recoding of each form of the interRAI-HC (version 2.0 and version 9.1). Although analyses showed there were no group differences in the time between testing conditions, it is important to recognise significant cognitive decline can occur within the 6 month criteria for this study. In addition, although consensus was indicated between the MDS-HC and the interRAI-HC (no significant group differences between outcome measures of each form), there are elements of each assessment that required significant recoding and aggregation of measures in order to ensure consistency. It is also important to recognise that no significant differences across each version of the interRAI form may reflect low sensitivity within individual measures and type II error. Improvements to measures and new items of potential value were often excluded from analysis, due to small sample size or coding inconsistencies.

In addition, the nature of types of data collected in the neuropsychological battery and measures within the interRAI-HC meant a number of statistical analyses were utilised. It is expected that some statistical significance would be due to chance alone, therefore some of the reported significant results may be spurious.

4.2. Future Directions

The interRAI-HC assessment system involves three levels of assessment: individual item measurement (Morris, et al., 1997), Outcome Scales (Morris et al., 2000) and Clinical Assessment Protocols (CAPs; Hirdes et al., 2008). CAPs are designed to assist interpretation, highlight key issues and guide specified interventions for each individual care plan (Morris et al., 2009). Only the outcome measures and individual assessment items were included this study, as CAP data was unavailable. It is important that future exploratory studies of this nature consider CAP measures in conjunction with the complete interRAI-HC assessment instrument to evaluate the characterisation of chronic illness. Future

investigations must also evaluate the ability of the interRAI-HC to allocate appropriate community interventions to meet assessed need.

Since the advent of this study, the CPS has been evaluated and revised to introduce the CPS2 (Morris et al., 2016). The revision of the CPS aimed to adjust the measure to expand the scale of the measure and make it more sensitive to early cognitive impairment (Morris et al., 2016). The failure of the CPS to identify early cognitive impairment and difference of cognition between PDN and PDD was of interest to this sample. Individual items of cognition which form the final score on the CPS were also examined in this study, and the item of "cognition in daily decision making" was indicated as a possible weakness for the CPS in this sample. In the development of the CPS2, the item "cognition in daily decision making" held the strongest correlation with scores on the MMSE (Morris et al., 2016). As this result was not seen in this study, it is important that further investigations review the CPS2 and its relevance in assessing early cognitive impairment in PD.

Finally, further analysis utilising large scale or national datasets are required to continue to clarify the assessment of PD in the interRAI-HC. The discrepancy seen between the ADL – Long Form and similar measures of IADL is of interest in this study, and further research to clarify the assessment of functional independence for PD may be of benefit. Due to the constellation of symptoms associated with PD accurate assessment is complex, particularly for cognition and functional independence. For example, classic PD symptoms such as fatigue, depression, psychomotor slowing and sleep disturbance can have a major impact on and individual's cognitive ability, but can reflect impairment outside of pathological neurodegeneration of cognitive processes. This can lead to fluctuations of cognitive performance, reflecting motor and non-motor symptom severity rather than true cognitive performance. Similarly, motor symptoms in PD often impact an individual's ability to perform activities of daily living, but can confuse motor impairment with cognitive decline. In this way, large scale analyses which clarify the assessment of ADL and IADL, alongside motor

symptoms and cognition is essential to clarify the accuracy of the interRAI-HC for use in PD, and may lead to further developments within the instrument to benefit all populations.

4.3. Concluding remarks

This study examined the characterisation of cognitive functioning, motor symptoms and non-motor symptoms for PD using the interRAI-HC, and establish the relevance of this assessment system in the identification of PDN, PDMCI and PDD. Despite an inability of several measures to identify groups differences in this sample, the interRAI-HC IADL outcome scales, and individual item of falls and elements of cognition appear relevant to the differential presentation of cognitive status in PD. Due to the importance of comprehensive assessment in PD (Chaudhuri, Yates, Martinez-Martin, 2005), the interRAI-HC remains a potential assessment of interest for this population. However, additional large scale research is required to further validate the interRAI-HC, clarify the assessment of PD in the community.

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Appendices

Appendix A: interRAI-HC version 9.1. NZ Customisation (interRAI, 2012)

interRAI™ HOME CARE (HC) ASSESSMENT FORM
Version 9.1 © interRAI 1994–2009
New Zealand Customisation

SECTION A: IDENTIFICATION INFORMATION

1. NAME
a. (First) b. (Middle Initial) c. (Last)

2. GENDER M. Male F. Female U. Unknown I. Indeterminate

3. BIRTHDATE

4. MARITAL STATUS
1. Never Married
2. Married/Civil Union/Defacto
3. Widowed
4. Separated
5. Divorced
6. Other

5. NATIONAL HEALTH IDENTIFIER
a. NHI NUMBER
b. Does the person have a current community services card for this assessment? 0. No 1. Yes
c. ACC CLAIM NUMBER:

6. FACILITY / AGENCY NUMBER

7. ELIGIBILITY FOR PUBLICLY FUNDED HEALTH SERVICES IN NEW ZEALAND *[check all that apply]*
a. New Zealand resident/citizen
b. Work Visa
c. Australian resident in NZ
d. UK or Australian visiting NZ
e. ACC accepted claims

8. REASON FOR ASSESSMENT
1. First Assessment
2. Routine Assessment
3. Return Assessment
4. Significant change in status reassessment
5. Discharge assessment covers last 3 days of service
6. Discharge tracking only
7. Other – e.g. research

9. ASSESSMENT REFERENCE DATE

Are you happy for your assessment information to be used for planning and research? Your name, address and any other identifying information will be removed.

0. Client or person entitled to consent on behalf of client agrees.
1. Client disagrees or is not competent to make informed choice or person entitled to consent on behalf of client disagrees.

10. PERSON'S EXPRESSED GOALS OF CARE

Primary Goal

11. DOMICILE CODE OF RESIDENCE
Domicile code of usual living arrangement

12. RESIDENTIAL / LIVING STATUS AT TIME OF ASSESSMENT
1. Private home/apartment/rented room
2. Board and care
3. Assisted living or semi-independent living
4. Mental health residence—e.g., psychiatric group home
5. Group home for persons with physical disability
6. Setting for persons with intellectual disability
7. Psychiatric hospital or unit
8. Homeless (with or without shelter)
9. Long-term care facility (nursing home)
10. Rehabilitation hospital/unit
11. Hospice facility/palliative care unit
12. Acute care hospital
13. Correctional facility
14. Other

13. LIVING ARRANGEMENT
a. Lives
1. Alone
2. With spouse / partner only
3. With spouse / partner and other(s)
4. With child (not spouse / partner)
5. With parent(s) or guardian(s)
6. With siblings(s)
7. With other relatives
8. With non-relative(s)

b. As compared to 90 DAYS AGO (or since last assessment), person now lives with someone new e.g., moved in with another person, other moved in 0. No 1. Yes

c. Person or relative feels that the person would be better off living elsewhere 0. No 1. Yes

14. TIME SINCE LAST HOSPITAL STAY
Code for most recent instance in LAST 90 DAYS
0. No hospitalisation within 90 days
1. 31–90 days ago
2. 15–30 days ago
3. 8–14 days ago
4. In the last 7 days
5. Now in hospital

SECTION B: INTAKE AND INITIAL HISTORY
[Note: Complete at Admission/First Assessment Only]

1. DATE CASE OPENED

2. ETHNICITY *[check at least one but no more than three options]*

10 European not further defined	41 Southeast Asian
11 New Zealand European	42 Chinese
12 Other European	43 Indian
21 Māori	44 Other Asian
30 Pacific peoples not further defined	51 Middle Eastern
31 Samoan	52 Latin American / Hispanic
32 Cook Island Māori	53 African (or any group of African origin)
33 Tongan	61 Other ethnicity
34 Niuean	94 Don't know
35 Tokelauan	95 Refused to answer
36 Fijian	97 Response unidentifiable
37 Other Pacific peoples	99 Not stated
40 Asian not further defined	

3. PRIMARY LANGUAGE *[see manual for codes]*

4. RESIDENTIAL HISTORY OVER LAST 5 YEARS

Code for all settings person lived in during 5 YEARS prior to date stay began (Item B1) 0. No 1. Yes

a. Long-term care facility—e.g., nursing home ☐
b. Board and care home or assisted living ☐
c. Mental health residence—e.g., psychiatric group home ☐
d. Psychiatric hospital or unit ☐
e. Setting for persons with intellectual disability ☐

SECTION C: COGNITION

1. COGNITIVE SKILLS FOR DAILY DECISION MAKING

Making decisions regarding tasks of daily life—(e.g., when to get up or have meals, which clothes to wear, or activities to do.

0. **INDEPENDENT**—decisions consistent/reasonable/safe ☐
1. **MODIFIED INDEPENDENCE**—some difficulty in new situations only
2. **MINIMALLY IMPAIRED**—in specific situations, decisions become poor or unsafe and cues/supervision necessary at those times
3. **MODERATELY IMPAIRED**—decisions consistently poor or unsafe, cues/supervision required at all times
4. **SEVERELY IMPAIRED**—Never/rarely made decisions
5. **NO DISCERNIBLE CONSCIOUSNESS, COMA** (skip to Section G)

2. MEMORY RECALL ABILITY

Code for recall of what was learned or known

0. Yes, memory OK 1. Memory problem

a. **Short-term memory OK** ☐
- seems/appears to recall after five minutes

b. **Procedural memory OK** ☐
- can perform all or almost all steps in a multitask sequence without cues

c. **Situational memory OK** ☐
- Both; recognises caregiver's name/faces frequently encountered **AND** knows location of places regularly visited (bedroom, dining room, activity room, therapy room)

3. PERIODIC DISORDERED THINKING OR AWARENESS

Note: Accurate assessment requires conversations with staff, family, or others who have direct knowledge of the person's behaviour over time.

0. Behaviour not present
1. Behaviour present, consistent with usual functioning
2. Behaviour present, appears different from usual functioning (e.g. new onset or worsening; different from a few weeks ago)

a. **Easily distracted** ☐
e.g. episodes of difficulty paying attention, gets side-tracked

b. **Episodes of disorganised speech** ☐
e.g. speech is nonsensical, irrelevant, or rambling from subject to subject; loses train of thought

c. **Mental function varies over the course of the day** ☐
e.g. sometimes better, sometimes worse

4. ACUTE CHANGE IN MENTAL STATUS FROM PERSON'S USUAL FUNCTIONING

E.g. restlessness, lethargy, difficulty to arouse, altered environmental perception 0. No 1. Yes ☐

5. CHANGE IN DECISION MAKING

As compared to 90 days ago (or since last assessment)

0. Improved 2. Declined ☐
1. No change 8. Uncertain

SECTION D: COMMUNICATION AND VISION

1. MAKING SELF UNDERSTOOD (EXPRESSION)

Expressing information content–both verbal and non-verbal

0. **UNDERSTOOD**—Expresses ideas without difficulty ☐
1. **USUALLY UNDERSTOOD**—Difficulty finding words or finishing thoughts **BUT** if given time, little or no prompting usually required
2. **OFTEN UNDERSTOOD**—Difficulty finding words or finishing thoughts **AND** prompting usually required
3. **SOMETIMES UNDERSTOOD**—Ability is limited to making concrete requests
4. **RARELY/NEVER UNDERSTOOD**

2. ABILITY TO UNDERSTAND OTHERS (COMPREHENSION)

Understanding verbal information content (however able); with hearing aid normally used

0. **UNDERSTANDS**—clear comprehension ☐
1. **USUALLY UNDERSTANDS**—misses some part/intent of message, **BUT** comprehends most conversation
2. **OFTEN UNDERSTANDS**—misses some part/intent of message **BUT** with repetition or explanation can often comprehend conversation
3. **SOMETIMES UNDERSTANDS**—responds adequately to simple, direct communication
4. **RARELY/NEVER UNDERSTANDS**

3. HEARING Ability to hear (With hearing aid normally used) ☐

0. **ADEQUATE**—No difficulty in normal conversation, social interaction, listening to TV
1. **MINIMAL DIFFICULTY**—Difficulty in some environments (e.g., when person speaks softly or is more than 2 metres away)
2. **MODERATE DIFFICULTY**—Problem hearing normal conversation, requires quiet setting to hear well
3. **SEVERE DIFFICULTY**—Difficulty in all situations (e.g., speaker has to talk loudly or speak very slowly; or person reports that all speech is mumbled)
4. **NO HEARING**

4. VISION Ability to see in adequate light (with glasses or with other visual aid normally used) ☐

0. **ADEQUATE**—Sees fine detail, including regular print in newspapers/books
1. **MINIMAL DIFFICULTY**—Sees large print, but not regular print in newspapers/books
2. **MODERATE DIFFICULTY**—Limited vision; not able to see newspaper headlines. but can identify objects
3. **SEVERE DIFFICULTY**—Object identification in question, but eyes appear to follow objects; sees only light, colours, shapes
4. **NO VISION**

SECTION E: MOOD AND BEHAVIOUR

1. INDICATORS OF POSSIBLE DEPRESSED, ANXIOUS, SAD MOOD

Code for indicators observed in last 3 days, irrespective of the assumed cause *[Note: whenever possible, ask person.]*

0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days

a. **MADE NEGATIVE STATEMENTS** e.g. "Nothing matters." "Would rather be dead.", "What's the use.", "Let me die." ☐

b. **PERSISTENT ANGER WITH SELF OR OTHERS** e.g. easily annoyed, anger at care received ☐

c. **EXPRESSIONS, INCLUDING NONVERBAL, OF WHAT APPEAR TO BE UNREALISTIC FEARS** e.g., fear of being abandoned, left alone, or being with others; intense fear of specific objects or situations ☐

d. **REPETITIVE HEALTH COMPLAINTS** e.g., persistently seeks medical attention, incessant concern with body functions ☐

e. **REPETITIVE ANXIOUS COMPLAINTS/CONCERNS** non health-related e.g., persistently seeks attention/ reassurance regarding schedules, meals, laundry, clothing, relationships ☐

f. **SAD, PAINED, WORRIED FACIAL EXPRESSIONS** e.g., furrowed brow, constant frowning ☐

g. **CRYING, TEARFULNESS** ☐

h. **RECURRENT STATEMENTS THAT SOMETHING TERRIBLE IS ABOUT TO HAPPEN** e.g., believes he or she is about to die, have a heart attack ☐

i. **WITHDRAWAL FROM ACTIVITIES OF INTEREST** e.g., no interest in long standing activities or being with family or friends ☐

j. **REDUCED SOCIAL INTERACTION** ☐

k. **EXPRESSIONS, INCLUDING NONVERBAL, OF A LACK OF PLEASURE IN LIFE (ANHEDONIA)** e.g., "I don't enjoy anything anymore." ☐

2. SELF-REPORTED MOOD

0. Not in the last 3 days
1. Not in the last 3 days, but often feels that way
2. In 1-2 of the last 3 days
3. Daily in the last 3 days
8. Person could not (would not) respond

Ask: "In the last 3 days, how often have you felt…"

a. Little interest or pleasure in things you normally enjoy? ☐

b. Anxious, restless, or uneasy? ☐

c. Sad, depressed, or hopeless? ☐

3. BEHAVIOURAL SYMPTOMS

Code for indicators observed, irrespective of the assumed cause

0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1–2 of last 3 days
3. Exhibited daily in last 3 days

a. **WANDERING** moving with no rational purpose, seemingly oblivious to needs or safety ☐

b. **VERBAL ABUSE** others were threatened, screamed at cursed at ☐

c. **PHYSICAL ABUSE** Others were hit, shoved, scratched sexually abused ☐

d. **SOCIALLY INAPPROPRIATE/DISRUPTIVE BEHAVIOUR** made disruptive sounds or noises, screamed out, smeared or threw food or faeces, hoarded, rummaged through other's belongings ☐

e. **INAPPROPRIATE PUBLIC SEXUAL BEHAVIOUR OR PUBLIC DISROBING** ☐

f. **RESISTS CARE** taking medications/injections, ADL assistance, eating ☐

SECTION F: PSYCHOSOCIAL WELL-BEING

1. SOCIAL RELATIONSHIPS *[Note: Whenever possible, ask person]*

0. Never
1. More than 30 days ago
2. 8–30 days ago
3. 4-7days ago
4. In last 3 days
8. Unable to determine

a. Participation in social activities of long-standing interest ☐

b. Visit with a long-standing social relation or family member ☐

c. Other interaction with long-standing social relation or family member—e.g., telephone, e-mail ☐

d. Conflict or anger with family or friends ☐

e. Fearful of a family member or close acquaintance ☐

f. Neglected, abused, or mistreated ☐

2. LONELY

Says or indicates that he/she feels lonely 0. No 1. Yes ☐

3. CHANGE IN SOCIAL ACTIVITIES IN LAST 90 DAYS

[or since last assessment if less than 90 days ago]

Decline in level of participation in social, religious, occupational, or other preferred activities. IF THERE WAS A DECLINE, person distressed by this fact. ☐

0. No Decline
1. Decline, not distressed
2. Decline, distressed

4. LENGTH OF TIME ALONE DURING THE DAY

Morning and afternoon ☐

0. Less than 1 hour
1. 1-2 hours
2. More than 2 hours but less than 8 hours
3. 8 hours or more

5. MAJOR LIFE STRESSORS IN LAST 90 DAYS

e.g. episode of severe personal illness; death or severe illness of close family member/friend; loss of home; major loss of income/assets; victim of a crime such as robbery; loss of driving license/car ☐

0. No 1. Yes

SECTION G: FUNCTIONAL STATUS

1. IADL SELF-PERFORMANCE AND CAPACITY

0. **INDEPENDENT**—No help, setup, or supervision
1. **SETUP HELP ONLY**
2. **SUPERVISION**—Oversight/cuing
3. **LIMITED ASSISTANCE**—Help on some occasions
4. **EXTENSIVE ASSISTANCE**—Help throughout task, but performs 50% or more of task on own
5. **MAXIMAL ASSISTANCE**—Help throughout task, but performs less than 50% of task on own
6. **TOTAL DEPENDENCE**—Full performance by others during entire period
8. **ACTIVITY DID NOT OCCUR DURING ENTIRE PERIOD** * *do not use this for coding (B) CAPACITY*

	(A) PERFORMANCE	(B) CAPACITY
(A) Code for **PERFORMANCE** in routine activities around the home or in the community during the LAST 3 DAYS. (B) Code for **CAPACITY** based on presumed ability to carry out activity as independently as possible. This will require "speculation" by the assessor.		

a. **MEAL PREPARATION**
How meals are prepared (e.g., planning meals, cooking, assembling ingredients, setting out food and utensils)

b. **ORDINARY HOUSEWORK**
How ordinary work around the house is performed (e.g., doing dishes, dusting, making bed, tidying up, laundry)

c. **MANAGING FINANCES**
How bills are paid, cheque book is balanced, household expenses are budgeted, credit card account is monitored

d. **MANAGING MEDICATIONS**
How medications are managed (e.g., remembering to take medicines, opening bottles, taking correct drug dosages, giving injections, applying ointments)

e. **PHONE USE**
How telephone calls are made or received (with assistive devices such as large numbers on telephone, amplification as needed)

f. **STAIRS**
How full flight of stairs is managed (12–14 stairs)

g. **SHOPPING**
How shopping is performed for food and household items (e.g., selecting items, paying money) EXCLUDE TRANSPORTATION

h. **TRANSPORTATION**
How travels by public transportation (navigating system, paying fare) or driving self (including getting out of house, into and out of vehicles)

2. ADL SELF-PERFORMANCE

Consider all episodes over 3-day period

0. **INDEPENDENT**—No physical assistance, setup, or supervision in any episode
1. **INDEPENDENT, SETUP HELP ONLY**—Article or device provided or placed within reach, no physical assistance or supervision in any episode
2. **SUPERVISION**—Oversight/cuing
3. **LIMITED ASSISTANCE**—Guided manoeuvring of limbs, physical guidance without taking weight
4. **EXTENSIVE ASSISTANCE**—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks
5. **MAXIMAL ASSISTANCE**—Weight-bearing support (including lifting limbs) by 2+ helpers—OR—Weight-bearing support for more than 50% of subtasks
6. **TOTAL DEPENDENCE**—Full performance by others during all episodes
8. **ACTIVITY DID NOT OCCUR DURING ENTIRE PERIOD**

If all episodes are performed at the same level, score ADL at that level.

If any episodes at level 6, and others less dependent, score ADL as a 5.

Otherwise, focus on the three most dependent episodes [or all episodes if performed fewer than 3 times] If most dependent episode is 1, score ADL as 1. If not, score ADL as least dependent of those episodes in range 2–5.

a. **BATHING**
How takes full-body bath/shower. Includes how transfers in and out of bath or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area - EXCLUDE WASHING OF BACK AND HAIR

b. **PERSONAL HYGIENE**
How manages personal hygiene, including combing hair, brushing teeth, shaving, applying makeup, washing/drying face and hands EXCLUDE BATHS AND SHOWERS

c. **DRESSING UPPER BODY**
How client dresses and undresses (street clothes, underwear) above the waist, included prostheses, orthotics, fasteners, pullovers, etc.

d. **DRESSING LOWER BODY**
How client dresses and undresses (street clothes, underwear) from the waist down, includes prostheses, orthotics, belts, pants, skirts, shoes, and fasteners

e. **WALKING**
How walks between locations on same floor indoors

f. **LOCOMOTION**
How moves between locations on same floor (walking or wheeling). If in wheelchair, self-sufficiency once in chair

g. **TRANSFER TOILET**
How moves on and off toilet or commode

h. **TOILET USE**
How uses the toilet room (or commode, bedpan, urinal), cleans self after toilet use or incontinent episode(s), changes pad, manages ostomy or catheter, adjusts clothes EXCLUDES TRANSFER ON AND OFF TOILET

i. **BED MOBILITY**
How moves to and from lying position, turns from side to side, and positions body while in bed

j. **EATING**
How eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g., tube feeding, total parenteral nutrition)

3. LOCOMOTION/WALKING

a. **PRIMARY MODE OF LOCOMOTION**

0. Walking, no assistive device
1. Walking, uses assistive device—walking stick, walker, crutch, pushing wheelchair
2. Wheelchair, scooter
3. Bed-bound

b. **TIMED 4 METRE WALK**

Lay out a straight, unobstructed course. Have person stand in still position, feet just touching start line.
Then say: "When I tell you, begin to walk at a normal pace (with walking stick / walker if used). This is not a test of how fast you can walk. Stop when I tell you to stop. Is this clear?" Assessor may demonstrate test.

Then say: "Begin to walk now." Start stopwatch (or can count seconds) when first foot falls. End count when foot falls beyond 4-metre mark.

Then say: "You may stop now."

Enter time in seconds, up to 30 seconds

30. 30 or more seconds to walk 4 metres
77. Stopped before test complete
88. Refused to do the test
99. Not tested–e.g., does not walk on own

c. **DISTANCE WALKED**

Farthest distance walked at one time without sitting down in the LAST 3 DAYS (with support as needed)

0. Did not walk
1. Less than 5 metres
2. 5–49 metres
3. 50–99 metres
4. 100+ metres
5. 1+ kilometres

d. DISTANCE WHEELED SELF

Farthest distance wheeled self at one time in the LAST 3 DAYS (includes independent use of motorised wheelchair).

0. Wheeled by others
1. Used motorised wheelchair / scooter
2. Wheeled self less than 5 metres
3. Wheeled self 5-49 metres
4. Wheeled self 50-99 metres
5. Wheeled self 100+ metres
8. Did not use wheelchair

4. ACTIVITY LEVEL

a. Total hours of exercise or physical activity in LAST 3 DAYS e.g. walking

0. None
1. Less than 1 hour
2. 1–2 hours
3. 3–4 hours
4. More than 4 hours

b. In the LAST 3 DAYS, number of days went out of the house or building in which he / she resides (no matter how short the period)

0. No days out
1. Did not go out in last 3 days, but usually goes out over a 3-day period
2. 1–2 days
3. 3 days

5. PHYSICAL FUNCTION IMPROVEMENT POTENTIAL

a. Person believes he / she is capable of improved performance in physical function 0. No 1. Yes

b. Health professional believes person is capable of improved performance in physical function 0. No 1. Yes

6. CHANGE IN ADL STATUS

As compared to 90 days ago, or since last assessment if less than 90 days ago

0. Improved
1. No change
2. Declined
8. Uncertain

7. DRIVING

a. Drove car (vehicle) in the LAST 90 DAYS 0. No 1. Yes

b. If drove in LAST 90 DAYS, assessor is aware that someone has suggested that person limits OR stops driving 0. No 1. Yes

SECTION H: CONTINENCE

1. BLADDER CONTINENCE

0. **CONTINENT**—Complete control; DOES NOT USE any type of catheter or urinary collection device
1. **CONTINENT WITH CATHETER**— Control with any catheter or ostomy over the last 3 days
2. **INFREQUENTLY INCONTINENT**— Not incontinent over last 3 days, but does have incontinent episodes
3. **OCCASIONALLY INCONTINENT**—Less than Daily
4. **FREQUENTLY INCONTINENT**—Daily, but some control present
5. **INCONTINENT**—No control present
8. **DID NOT OCCUR**—No urine output from bladder in last 3 days

2. URINARY COLLECTION DEVICE *(Excludes pads/briefs)*

0. None
1. Urodome
2. Indwelling catheter
3. Cystostomy, nephrostomy, ureterostomy

3. BOWEL CONTINENCE

0. **CONTINENT**—Complete control; DOES NOT USE ostomy device
1. **CONTINENT WITH OSTOMY**— Control with ostomy device over the last 3 days
2. **INFREQUENTLY INCONTINENT** — Not incontinent over last 3 days, but does have incontinent episodes
3. **OCCASIONALLY INCONTINENT**—Less than daily
4. **FREQUENTLY INCONTINENT**—Daily, but some control present
5. **INCONTINENT**—No control present
8. **DID NOT OCCUR**—No bowel movement in the last 3 days

4. PADS OR BRIEFS WORN 0. No 1. Yes

SECTION I: DISEASE DIAGNOSES

1. DISEASES

Disease/infection that doctor has indicated is present and affects client's status, requires treatment, or symptom management. Also include if disease is monitored by a home care professional or is the reason for a hospitalization in LAST 90 DAYS (or since last assessment if less than 90 days)

0. Not present
1. Primary diagnosis/diagnoses for current stay
2. Diagnosis present, receiving active treatment
3. Diagnosis present, monitored but no active treatment

MUSCULO-SKELETAL

a. Hip fracture during last 30 days (or since last assessment if less than 30 days)
b. Other fracture during last 30 days (or since last assessment if less than 30 days)

NEUROLOGICAL

c. Alzheimer's disease
d. Dementia other than Alzheimer's disease
e. Hemiplegia
f. Multiple sclerosis
g. Paraplegia
h. Parkinson's disease
i. Quadriplegia
j. Stroke/CVA

CARDIAC OR PULMONARY

k. Coronary heart disease
l. Chronic obstructive pulmonary disease
m. Congestive heart failure

PSYCHIATRIC

n. Anxiety
o. Bipolar disorder
p. Depression
q. Schizophrenia

INFECTIONS

r. Pneumonia
s. Urinary tract infection in last 30 days

OTHER

t. Cancer ☐

u. Diabetes mellitus ☐

2. OTHER DISEASE

0. Not present
1. Primary diagnosis/diagnoses for current stay
2. Diagnosis present, receiving active treatment
3. Diagnosis present, monitored but no active treatment

DIAGNOSIS	DISEASE CODE	ICD CODE
a.		
b.		
c.		
d.		

SECTION J: HEALTH CONDITIONS

1. FALLS

0. No fall in last 90 days
1. No fall in last 30 days, but fell 31–90 days ago
2. One fall in last 30 days
3. Two or more falls in last 30 days

☐

2. RECENT FALLS

(Skip / not applicable if last assessed more than 30 days ago or if this is first assessment) 0. No 1. Yes ☐

3. PROBLEM FREQUENCY

Code for presence in last 3 days

0. Not present
1. Present but no exhibited in last 3 days
2. Exhibited on 1 of last 3 days
3. Exhibited on 2 of last 3 days
4. Exhibited daily in last 3 days

BALANCE

a. Difficult or unable to move self to standing position unassisted ☐

b. Difficult or unable to turn self around and face the opposite direction when standing ☐

c. Dizziness ☐

d. Unsteady gait ☐

CARDIAC OR PULMONARY

e. Chest pain ☐

f. Difficulty clearing airway secretions ☐

PSYCHIATRIC

g. Abnormal thought process—e.g., loosening of associations, blocking, flight of ideas, tangentiality, circumstantiality ☐

h. Delusions—Fixed, false beliefs ☐

i. Hallucinations—False sensory perceptions ☐

NEUROLOGICAL

j. Aphasia ☐

GI STATUS

k. Acid reflux—Regurgitation of acid from stomach to throat ☐

l. Constipation—No bowel movement in 3 days or difficult passage of hard stool ☐

m. Diarrhoea ☐

n. Vomiting ☐

SLEEP PROBLEMS

o. Difficulty falling asleep or staying asleep; waking up too early; restlessness; non-restful sleep ☐

p. Too much sleep—Excessive amount of sleep that interferes with person's normal functioning ☐

OTHER

q. Aspiration ☐

r. Fever ☐

s. GI or GU bleeding ☐

t. Hygiene - unusually poor hygiene, unkempt, dishevelled ☐

u. Peripheral oedema ☐

4. DYSPNOEA (SHORTNESS OF BREATH)

0. Absence of symptom ☐
1. Absent at rest, but present when performed moderate activities
2. Absent at rest, but present when performed normal day-to-day activities
3. Present at rest

5. FATIGUE

Inability to complete normal daily activities—e.g., ADLs, IADLs

0. None ☐
1. Minimal– Diminished energy but completes normal day-to-day activities
2. Moderate–Due to diminished energy, UNABLE TO FINISH normal day-to-day activities
3. Severe—Due to diminished energy, UNABLE TO START SOME normal day-to-day activities
4. Unable to commence any normal day-to-day activities–Due to diminished energy

6. PAIN SYMPTOMS

(Note: Always ask the person about pain frequency, intensity, and control. Observe person and ask others who are in contact with the person.)

a. Frequency with which person complains or shows evidence of pain *(including grimacing, teeth clenching, moaning, withdrawal when touched, or other nonverbal signs suggesting pain)*

0. No pain ☐
1. Present but not exhibited in last 3 days
2. Exhibited on 1–2 of last 3 days
3. Exhibited daily in last 3 days

b. Intensity of highest level of pain present ☐

0. No pain
1. Mild
2. Moderate
3. Severe
4. Times when pain is horrible or excruciating

c. Consistency of pain ☐

0. No pain
1. Single episode during last 3 days
2. Intermittent
3. Constant

d. Breakthrough pain 0. No 1. Yes ☐

Times in LAST 3 DAYS when person experienced sudden, acute flare-ups of pain

e. Pain control

Adequacy of current therapeutic regimen to control pain (from person's point of view)

0. No issue of pain
1. Pain intensity acceptable to person; no treatment regimen or change in regimen required
2. Controlled adequately by therapeutic regimen
3. Controlled when therapeutic regimen followed, but not always followed as ordered
4. Therapeutic regimen followed, but pain control not adequate
5. No therapeutic regimen being followed for pain; pain not adequately controlled

7. INSTABILITY OF CONDITIONS 0. No 1. Yes

a. Conditions / diseases make cognitive, ADL, mood, or behaviour patterns unstable (fluctuating, precarious, or deteriorating)

b. Experiencing an acute episode, or a flare-up of a recurrent or chronic problem

c. End-stage disease, 6 or fewer months to live.

8. SELF-REPORTED HEALTH

Ask: "In general, how would you rate your health?"

0. Excellent 2. Fair 8. Could not (would not) respond
1. Good 3. Poor

9. TOBACCO AND ALCOHOL

a. Smokes tobacco daily

0. No
1. Not in last 3 days, but is usually a daily smoker
2. Yes

b. Alcohol—Highest number of drinks in any "single sitting" in LAST 14 DAYS

0. None 2. 2–4
1. 1 3. 5 or more

SECTION K: ORAL AND NUTRITIONAL STATUS

1. HEIGHT AND WEIGHT

a. Record HEIGHT in centimetres

b. Record WEIGHT in kilograms. Base weight on most recent measure taken in LAST 30 DAYS

2. NUTRITIONAL ISSUES 0. No 1. Yes

(Note: NZ assessors we do not use the BUN/Creatinine measures)

a. Weight loss of 5% or more in LAST 30 DAYS, or 10% or more in LAST 180 DAY

b. Dehydrated, or BUN / Cre Ratio >25

c. Fluid intake less than 1,000 cc per day

d. Fluid output exceeds input

e. Decrease in amount of food or fluid usually consumed

f. Ate one or fewer meals on AT LEAST 2 of LAST 3 DAYS

3. MODE OF NUTRITIONAL INTAKE

0. NORMAL Swallows all types of food
1. MODIFIED INDEPENDENT e.g., liquid is sipped, takes limited solid food; need for modification may be unknown
2. REQUIRES DIET MODIFICATION TO SWALLOW SOLID FOOD e.g., mechanical diet (puree, minced, etc.) or only able to ingest specific food
3. REQUIRES MODIFICATION TO SWALLOW LIQUIDS e.g., thickened liquids
4. CAN SWALLOW ONLY PUREED SOLIDS AND THICKENED LIQUIDS
5. COMBINED ORAL AND PARENTERAL OR TUBE FEEDING
6. NASOGASTRIC TUBE FEEDING ONLY
7. ABDOMINAL FEEDING TUBE e.g., PEG tube
8. PARENTERAL FEEDING ONLY Includes all types of parenteral feedings, such as total parenteral nutrition (TPN)
9. ACTIVITY DID NOT OCCUR During entire period

4. DENTAL OR ORAL 0. No 1. Yes

a. Wears a denture (removable prosthesis)

b. Has broken, fragmented, loose, or otherwise non-intact natural teeth

c. Reports having dry mouth

d. Reports difficulty chewing

SECTION L: SKIN CONDITION

1. MOST SEVERE PRESSURE ULCER

0. No pressure ulcer
1. Any area of persistent skin redness
2. Partial loss of skin layers
3. Deep craters in the skin
4. Breaks in skin exposing muscle or bone
5. Not codeable, e.g., necrotic eschar predominant

2. PRIOR PRESSURE ULCER 0. No 1. Yes

3. PRESENCE OF SKIN ULCER OTHER THAN PRESSURE ULCER

E.g., venous ulcer, arterial ulcer, mixed venous-arterial ulcer, diabetic foot ulcer 0. No 1. Yes

4. MAJOR SKIN PROBLEMS 0. No 1. Yes

E.g., lesions, 2nd- or 3rd-degree burns, healing surgical wound

5. SKIN TEARS OR CUTS Other than surgery 0. No 1. Yes

6. OTHER SKIN CONDITIONS OR CHANGES IN SKIN CONDITION

E.g., bruises, rashes, itching, mottling, herpes zoster, intertrigo, eczema 0. No 1. Yes

7. FOOT PROBLEMS

E.g., bunions, hammertoes, overlapping toes, structural problems, infections, ulcers

0. No Foot Problems
1. Foot Problems, no limitation in walking
2. Foot problems limit walking
3. Foot Problems prevent walking
4. Foot problems, does not walk for other reasons

SECTION M: MEDICATIONS

1. ALLERGY TO ANY DRUG

0. No known drug allergies 1. Yes ☐

2. ADHERENT WITH MEDICATIONS PRESCRIBED BY PHYSICIAN

☐

0. Always adherent
1. Adherent 80% of time or more
2. Adherent less than 80% of time, including failure to purchase prescribed medications
3. No medications prescribed

3. LIST OF ALL MEDICATIONS

List all active prescriptions and nonprescribed (over-the-counter) medications taken in the LAST 3 DAYS
Note: Use computerised records if possible, hand enter only when absolute necessary. FOR EACH DRUG RECORD:

a. **NAME**

b. **DOSE**—A positive number such as 0.5, 5, 150, 300. [Note: Never write a zero by itself after a decimal point (X.0 mg)]

c. **UNIT**—Code using the following list:

gtts (drops)	ml (millilitres)
gm (grams)	oz (ounces)
L (litres)	puffs
mcg (micrograms)	% (percent)
mEq (milli-equivalent)	units
mg (milligrams)	oth (other)

d. **ROUTE OF ADMINISTRATION**—Code using the following list:

PO (By mouth)	IH (Inhalation)
SL (Sub lingual)	ET (Enteral tube)
IM (Intramuscular)	R (Rectal)
IV (Intravenous)	TD (transdermal)
SQ (Subcutaneous)	NAS (nasal)
EYE (eye)	Other
TOP (Topical)	

e. **FREQ**—Code the number of times per day, week, or month the medication is administered using the following list:

Q1H. Every hour	Q3D. Every three days
Q2H. Every two hours	Weekly. Once each week
Q3H. Every three hours	2W. Two times weekly
Q4H. Every four hours	3W. Three times weekly
Q6H. Every six hours	4W. Four times weekly
Q8H. Every eight hours	5W. Five times weekly
5D. Five times daily	6W. Six times weekly
BED Bedtime	1M. Monthly
BID. Two times daily	2M. Twice every month
TID. Three times daily	OTH. Other
QID. Four times daily	
Q2D. Every other day	

f. PRN	g. COMPUTER-ENTERED DRUG CODE					
a. Medication Name	b. Dose	c. Unit	d. Route	e. Freq	f. PRN	g. Drug

SECTION N: TREATMENT AND PROCEDURES

1. PREVENTION 0. No 1. Yes

a. Blood pressure measured in LAST YEAR ☐
b. Colonoscopy test in LAST 5 YEARS ☐
c. Dental exam in LAST YEAR ☐
d. Eye exam in LAST YEAR ☐
e. Hearing exam in LAST 2 YEARS ☐
f. Influenza vaccine in LAST YEAR ☐
g. Mammogram or breast exam in LAST 2 YEARS (for women) ☐
h. Pneumovax vaccine in LAST 5 YEARS or after age 65 ☐

2. TREATMENTS AND PROGRAMMES RECEIVED OR SCHEDULED IN THE LAST 3 DAYS *[or since last assessment if less than 3 days]*

0. Not ordered AND did not occur
1. Ordered, not implemented
2. 1–2 of last 3 days
3. Daily in last 3 days

TREATMENTS

a. Chemotherapy ☐
b. Dialysis ☐
c. Infection control e.g., isolation, quarantine ☐
d. IV medication ☐
e. Oxygen therapy ☐
f. Radiation ☐
g. Suctioning ☐
h. Tracheostomy care ☐
i. Transfusion ☐
j. Ventilator or respirator ☐
k. Wound care ☐

PROGRAMMES

l. Scheduled toileting programme ☐
m. Palliative care programme ☐
n. Turning/repositioning programme ☐

3. FORMAL CARE

Days (A) and Total minutes (B) of care in last 7 days.

Extent of care/treatment in LAST 7 DAYS *[or since last assessment or admission, if less than 7 days]*involving:

	(A) Days	(B) Mins
a. Personal care / support services		
b. Visiting nurses		
c. Household management services		
d. Meals		
e. Physiotherapy		
f. Occupational therapy		
g. Speech-language therapy services		
h. Psychological therapy (by any licensed mental health professional)		

4. HOSPITAL USE EMERGENCY ROOM USE PHYSICIAN VISIT

Code for number of times in LAST 90 DAYS *[or since last assessment if LESS THAN 90 DAYS]*

a. Inpatient acute care hospital with overnight stay ☐☐

b. Emergency room visit (not counting overnight stay) ☐☐

c. Physician visit (or authorised assistant or practitioner) ☐☐

5. PHYSICALLY RESTRAINED

Limbs restrained, used bed rails, restrained to chair when sitting

0. No 1. Yes ☐

SECTION O: RESPONSIBILITY

1. RESPONSIBILITY / LEGAL GUARDIAN 0. No 1. Yes

a. EPOA for personal care and welfare ☐

b. EPOA for property ☐

2. ADVANCE DIRECTIVES 0. Not in place 1. In place

a. Living will ☐

b. Do not resuscitate ☐

c. Do not hospitalise ☐

d. Organ donation ☐

e. Post mortem request ☐

f. Feeding restrictions ☐

g. Medication restrictions ☐

h. Other treatment restrictions ☐

SECTION P: SOCIAL SUPPORTS

1. TWO KEY INFORMAL HELPERS

a. **Relationship to person** Helper 1 2 ☐☐

1. Child or child-in-law
2. Spouse
3. Partner/significant other
4. Parent/guardian
5. Sibling
6. Other relative or whanau
7. Friend
8. Neighbour
9. No informal helper

b. **Lives with person** Helper 1 2 ☐☐

0. No
1. Yes, 6 months or less
2. Yes, more than 6 months
8. No informal helper

AREAS OF INFORMAL HELP DURING LAST 3 DAYS

0. No
1. Yes
8. No informal helper

c. **IADL help** ☐☐

d. **ADL help** ☐☐

2. INFORMAL HELPER STATUS 0. No 1. Yes

a. Informal helper(s) is unable to continue caring activities—e.g., decline in health of helper makes it difficult to continue ☐

b. Primary informal helper expresses feelings of distress, anger, or depression ☐

c. Family or close friends report feeling overwhelmed by person's illness ☐

3. HOURS OF INFORMAL CARE AND ACTIVE MONITORING DURING LAST 3 DAYS

For instrumental and personal activities of daily living in the LAST 3 DAYS, indicate the total number of hours of help received from all family, friends, and neighbours ☐☐☐

4. STRONG AND SUPPORTIVE RELATIONSHIP WITH FAMILY

0. No 1. Yes ☐

SECTION Q: ENVIRONMENTAL ASSESSMENT

1. HOME ENVIRONMENT

Code for any of the following that make home environment hazardous or uninhabitable (if temporarily in institution, base assessment on home visits 0. No 1. Yes

a. Disrepair of the home—e.g., hazardous clutter; inadequate or no lighting in living room, sleeping room, kitchen, toilet, corridors; holes in floor; leaking pipes ☐

b. Squalid condition—e.g., extremely dirty, infestation by rats or bugs ☐

c. Inadequate heating or cooling—e.g., too hot in summer, too cold in winter ☐

d. Lack of personal safety—e.g., fear of violence, safety problem in going to mailbox or visiting neighbours, heavy traffic in street ☐

e. Limited access to home or rooms in home—e.g., difficulty entering or leaving home, unable to climb stairs, difficulty manoeuvring within rooms, no railings although needed ☐

2. LIVES IN APARTMENT OR HOUSE RE-ENGINEERED ACCESSIBLE FOR PERSONS WITH DISABILITIES 0. No 1. Yes ☐

3. OUTSIDE ENVIRONMENT 0. No 1. Yes

a. Availability of emergency assistance—e.g., telephone, alarm response system ☐

b. Accessibility to grocery store without assistance ☐

c. Availability of home delivery of groceries ☐

4. FINANCES

Because of limited funds, during the last 30 days made trade-offs among purchasing any of the following: adequate food, shelter, clothing; prescribed medications; sufficient home heat or cooling; necessary health care 0. No 1. Yes ☐

SECTION R: DISCHARGE POTENTIAL AND OVERALL STATUS

1. ONE OR MORE CARE GOALS MET IN THE LAST 90 DAYS

(Or since last assessment if less than 90 days)

0. No 1. Yes ☐

2. OVERALL SELF- SUFFICIENCY HAS CHANGED SIGNIFICANTLY AS COMPARED TO STATUS OF 90 DAYS AGO

(Or since last assessment if less than 90 days) ☐

0. Improved [skip to Section S]
1. No change [skip to section S]
2. Deteriorated

CODE FOLLOWING THREE ITEMS IF "DETERIORATED" IN LAST 90 DAYS—OTHERWISE SKIP TO SECTION S

3. NUMBER OF 10 ADL AREAS IN WHICH PERSON WAS INDEPENDENT PRIOR TO DETERIORATION ☐

4. NUMBER OF 8 IADL PERFORMANCE AREAS IN WHICH PERSON WAS INDEPENDENT PRIOR TO DETERIORATION ☐

5. TIME OF ONSET OF THE PRECIPITATING EVENT OR PROBLEM RELATED TO DETERIORATION ☐

0. Within last 7 days
1. 8 to 14 days ago
2. 15 to 30 days ago
3. 31 to 60 days ago
4. More than 60 days ago
8. No clear precipitating event

SECTION S: DISCHARGE

1. LAST DAY OF STAY

Date of discharge

2. RESIDENTIAL / LIVING STATUS AFTER DISCHARGE ☐

1. Private home/apartment/rented room
2. Board and care
3. Assisted living or semi-independent living
4. Mental health residence—e.g., psychiatric group home
5. Group home for persons with physical disability
6. Setting for persons with intellectual disability
7. Psychiatric hospital or unit
8. Homeless (with or without shelter)
9. Long-term care facility (nursing home)
10. Rehabilitation hospital/unit
11. Hospice facility/palliative care unit
12. Acute care hospital
13. Correctional facility
14. Other
15. Deceased

SECTION T: ASSESSMENT INFORMATION

SIGNATURE OF PERSON COORDINATING/COMPLETING THE ASSESSMENT

DATE ASSESSMENT SIGNED AS COMPLETE

Appendix B: MDS-HC version 2.0 (Hirdes et al., 2000)

Name of Client _____ NHI Number _____

Minimum Data Set Home Care (MDS-HC)© New Zealand- Full Assessment

- Unless otherwise noted, score for last 3 days
- Examples of exceptions include IADLs/Continence/ Services/Treatments where status scored over last 7 days

Client Service Address Information

Address:

Suburb:

City:

Domicile Code:

Country:

Phone Number:

SECTION AA: NAME AND IDENTIFICATION INFORMATION

1	NAME OF CLIENT	a. Last/Family Name b. First Name c. Middle Name/Initial
2	NHI NUMBER	3 alpha + 4 numeric
3	ACC CLAIM NUMBER (details)	(NOTE/TEXT FIELD)
4	DOMICILE CODE OF RESIDENCE	See RAI-HC manual for homeless/missing codes. 4 alpha/numeric

SECTION BB. PERSONAL ITEMS

1	GENDER	**M.** Male **F.** Female
2a	BIRTH DATE	Day Month Year
2b	ESTIMATED BIRTH DATE	Birth date is estimated? **0.** No **1.** Yes
2c	DRIVERS LICENSE	Has current drivers license? **0.** No **1.** Yes
3	ETHNICITY	**(Check at least one but no more than three options)** 10 European not further defined 11 NZ European 12 Other European 21 NZ Maori 30 Pacific Island not further defined 31 Samoan 32 Cook Island Maori 33 Tongan 34 Niuean 35 Tokelauan 36 Fijian 37 Other Pacific Island (not listed) 40 Asian not further defined 41 South east Asian 42 Chinese 43 Indian 44 Other Asian 51 Middle Eastern 52 Latin American/Hispanic 53 African 54 Other 99 Not stated
4	MARITAL STATUS	**1.** Never married **2.** Married/Civil union/Defacto **3.** Widowed **4.** Separated **5.** Divorced **6.** Other

5	LANGUAGE	a. Primary language (See RAI-HC manual for additional codes.) **eng.** English **mri.** Maori b. Interpreter needed **0.** No **1.** Yes
6	RESPONSIBILITY/ ADVANCED DIRECTIVES	***(Code for responsibility/advanced directives)*** **0.** No **1.** Yes a. Client has enduring power of attorney or welfare guardian or property manager b. Client has advanced medical directives in place (for example, a do not hospitalize order)
7	ELIGIBILITY FOR PUBLICLY FUNDED HEALTH SERVICES IN NEW ZEALAND	***(Check all codes that apply)*** a. New Zealand resident / citizen b. Work permit holder c. Australian resident in NZ/visiting NZ d. UK citizen visiting NZ e. ACC accepted claims
8	DETAILS ON ENTITLEMENTS (e.g. income support)	(Note box used to note details of various entitlements people may have.)

SECTION CC. REFERRAL ITEMS *(Complete at Intake Only)*

1	DATE CASE OPENED/ REOPENED	Day Month Year
2	REASON FOR REFERRAL	**1.** Community support needs assessment **2.** Community clinical assessment **3.** Acute service in-patient **4.** Rehabilitation service in-patient **5.** Rehabilitation service community **6.** Support services review assessment **7.** Other
3	UNDERSTANDING OF GOALS OF CARE	***(Code for client/family understanding of goals of care)*** **0.** No **1.** Yes a. Assessment/treatment by registered nurses b. Monitoring to avoid clinical complications c. Rehabilitation d. Client/family education e. Family respite f. Palliative care g. To remain at home h. Facility Placement

Name of Client _____ NHI Number _____

4	TIME SINCE LAST HOSPITAL STAY	Time since discharge from last inpatient setting ***(Code for most recent instance in LAST 180 DAYS)*** **0**. Presently in hospital **1**. No hospitalization within 180 days **2**. Within last week **3**. Within 8 to 14 days **4**. Within 15 to 30 days **5**. More than 30 days ago	☐
5	WHERE LIVED AT TIME OF REFERRAL	**1**. Private home/apt. with no home care services **2**. Private home/apt. with home care services **3**. Board and care/assisted living/group home **4**. Residential care facility **5**. Other	☐
6	WHO LIVED WITH AT REFERRAL	**1**. Lived alone **2**. Lived with spouse only **3**. Lived with spouse and other(s) **4**. Lived with child (not spouse) **5**. Lived with other(s) (not spouse or children) **6**. Lived in group setting with non-relative(s)	☐
7	PRIOR RESIDENTIAL CARE FACILITY PLACEMENT	Resided in a residential care facility at anytime during **5 YEARS** prior to case opening **0**. No **1**. Yes	☐
8	RESIDENTIAL HISTORY	Moved to current residence within last two years. **0**. No **1**. Yes	☐

SECTION A. ASSESSMENT INFORMATION

1	ASSESSMENT REFERENCE DATE	***Date of assessment*** ☐☐ Day ☐☐ Month ☐☐☐☐ Year	
2	REASON FOR ASSESSMENT	***Type of assessment*** **1**. Initial assessment **2**. Follow-up assessment **3**. Routine assessment at fixed intervals **4**. Review within 30-day period prior to discharge from the programme **5**. Review at return from hospital **6**. Change in status **7**. Discharge/transfer from service **8**. Other	☐

SECTION B. COGNITIVE PATTERNS

1	MEMORY RECALL ABILITY	***(Code for recall of what was learned or known)*** **0**. Memory OK **1**. Memory problem	
		a. Short-term memory OK—seems/appears to recall after 5 minutes	☐
		b. Procedural memory OK—can perform all or almost all steps in a multitask sequence without cues for initiation	☐
2	COGNITIVE SKILLS FOR DAILY DECISION-MAKING	a. How well client made decisions about organizing the day (e.g. when to get up or have meals, which clothes to wear or activities to do) **0**. *INDEPENDENT*—Decisions consistent/reasonable/safe **1**. *MODIFIED INDEPENDENCE*—Some difficulty in new situations only **2**. *MINIMALLY IMPAIRED*—In specific situations, decisions become poor or unsafe and cues/supervision necessary at those times **3**. *MODERATELY IMPAIRED*—Decisions consistently poor or unsafe, cues/supervision required at all times **4**. *SEVERELY IMPAIRED*—Never/rarely made decisions	☐
		b. Worsening of decision making as compared to status of **90 DAYS AGO** (or since last assessment if less than 90 days) **0**. No **1**. Yes	☐
3	INDICATORS OF DELIRIUM	a. Sudden or new onset/change in mental function over **LAST 7 DAYS** (including ability to pay attention, awareness of surroundings, being coherent, unpredictable variation over course of day) **0**. No **1**. Yes	☐
		b. In the **LAST 90 DAYS** (or since last assessment if less than 90 days), client has become agitated or disoriented such that his or her safety is endangered or client requires protection by others **0**. No **1**. Yes	☐

SECTION C. COMMUNICATION/HEARING PATTERNS

1	HEARING	***(With hearing aid if used)*** **0**. *HEARS ADEQUATELY*—Normal talk, TV, phone, doorbell **1**. *MINIMAL DIFFICULTY*—When not in quiet setting **2**. *HEARS IN SPECIAL SITUATIONS ONLY*—Speaker has to adjust tonal quality and speak distinctly **3**. *HIGHLY IMPAIRED*—Absence of useful hearing	☐
2	MAKING SELF UNDER-STOOD (Expression)	***(Expressing information content—however able)*** **0**. *UNDERSTOOD*—Expresses ideas without difficulty **1**. *USUALLY UNDERSTOOD*—Difficulty finding words or finishing thoughts BUT if given time, little or no prompting required **2**. *OFTEN UNDERSTOOD*—Difficulty finding words or finishing thoughts, prompting usually required **3**. *SOMETIMES UNDERSTOOD*—Ability is limited to making concrete requests **4**. *RARELY/NEVER UNDERSTOOD*	☐
3	ABILITY TO UNDER-STAND OTHERS (Compre-hension)	***(Understands verbal information—however able)*** **0**. *UNDERSTANDS*—Clear comprehension **1**. *USUALLY UNDERSTANDS*—Misses some part/intent of message, BUT comprehends most conversation with little or no prompting **2**. *OFTEN UNDERSTANDS*—Misses some part/intent of message; with prompting can often comprehend conversation **3**. *SOMETIMES UNDERSTANDS*—Responds adequately to simple, direct communication **4**. *RARELY/NEVER UNDERSTANDS*	☐
4	COMMUNI-CATION DECLINE	Worsening in communication (making self understood or understanding others) as compared to status of **90 DAYS AGO** (or since last assessment if less than 90 days) **0**. No **1**. Yes	☐

SECTION D. VISION PATTERNS

1	VISION	***(Ability to see in adequate light and with glasses if used)*** **0**. *ADEQUATE*—Sees fine detail, including regular print in newspapers/books **1**. *IMPAIRED*—Sees large print, but no regular print in newspapers/books **2**. *MODERATELY IMPAIRED*—Limited vision; not able to see newspaper headlines, but can identify objects **3**. *HIGHLY IMPAIRED*—Object identification in question, but eyes appear to follow objects **4**. *SEVERELY IMPAIRED*—No vision or sees only light, colours, or shapes; eyes do not appear to follow objects	☐
2	VISUAL LIMITATION/ DIFFI-CULTIES	Saw halos or rings around lights, curtains over eyes, or flashes of lights **0**. No **1**. Yes	☐

Name of Client _____ NHI Number _____

3	VISION DECLINE	Worsening of vision as compared to status of **90 DAYS AGO** (or since last assessment if less than 90 days) **0**. No **1**. Yes	☐

SECTION E. MOOD AND BEHAVIOUR PATTERNS

1	INDICATORS OF DEPRESSION, ANXIETY, SAD MOOD	***(Code for observed indicators irrespective of the assumed cause)*** **0**. Indicator not exhibited in last 3 days **1**. Exhibited 1–2 of last 3 days **2**. Exhibited on each of last 3 days	
		a. **A FEELING OF SADNESS OR BEING DEPRESSED**, that life is not worth living, that nothing matters, that he or she is of no use to anyone or would rather be dead	☐
		b. **PERSISTENT ANGER WITH SELF OR OTHERS**—e.g. easily annoyed, anger at care received	☐
		c. **EXPRESSIONS OF WHAT APPEAR TO BE UNREALISTIC FEARS**—e.g. fear of being abandoned, left alone, being with others	☐
		d. **REPETITIVE HEALTH COMPLAINTS**—e.g. persistently seeks medical attention, obsessive concern with body functions	☐
		e. **REPETITIVE ANXIOUS COMPLAINTS, CONCERNS**—e.g. persistently seeks attention/ reassurance regarding schedules, meals, laundry, clothing, relationship issues	☐
		f. **SAD, PAINED, WORRIED FACIAL EXPRESSIONS**—e.g. furrowed brows	☐
		g. **RECURRENT CRYING, TEARFULNESS**	☐
		h. **WITHDRAWAL FROM ACTIVITIES OF INTEREST**—e.g. no interest in long standing activities or being with family/friends	☐
		i. **REDUCED SOCIAL INTERACTION**	☐
2	MOOD DECLINE	Mood indicators have become worse as compared to status of **90 days ago** (or since last assessment if less than 90 days) **0**. No **1**. Yes	☐
3	BEHAVIOURAL SYMPTOMS	Instances when client exhibited behavioural symptoms. If EXHIBITED, ease of altering the symptom when it occurred. **0**. Did not occur in last 3 days **1**. Occurred, easily altered **2**. Occurred, not easily altered	
		a. **WANDERING**—Moved with no rational purpose, seemingly oblivious to needs or safety	☐
		b. **VERBALLY ABUSIVE BEHAVIOURAL SYMPTOMS**—Threatened, screamed at, cursed at others	☐
		c. **PHYSICALLY ABUSIVE BEHAVIOURAL SYMPTOMS**—Hit, shoved, scratched, sexually abused others	☐
		d. **SOCIALLY INAPPROPRIATE/ DISRUPTIVE BEHAVIOURAL SYMPTOMS**—Disruptive sounds, noisiness, screaming, self-abusive acts, sexual behaviour or disrobing in public, smears/ throws food/faeces, rummaging, repetitive behaviour, rises early and causes disruption	☐
		e. **RESISTS CARE**—Resisted taking medications/ injections, ADL assistance, eating, or changes in position	☐
4	CHANGES IN BEHAVIOUR SYMPTOMS	Behavioural symptoms have become worse or are less well tolerated by family as compared to **90 DAYS AGO** (or since last assessment if less than 90 days) **0**. No, or no change in behavioural symptoms or acceptance by family **1**. Yes	☐

SECTION F. SOCIAL FUNCTIONING

1	INVOLVEMENT	a. At ease interacting with others (e.g. likes to spend time with others) **0**. At ease **1**. Not at ease	☐
		b. Openly expresses conflict or anger with family/friends **0**. No **1**. Yes	☐
2	CHANGE IN SOCIAL ACTIVITIES	As compared to **90 DAYS AGO** (or since last assessment if less than 90 days ago), decline in the client's level of participation in social, religious, occupational or other preferred activities. IF THERE WAS A DECLINE, client distressed by this fact **0**. No decline **1**. Decline, not distressed **2**. Decline, distressed	☐
3	ISOLATION	a. Length of time client is alone during the day (morning and afternoon) **0**. Never or hardly ever **1**. About one hour **2**. Long periods of time—e.g. all morning **3**. All of the time	☐
		b. Client says or indicates that he/she feels lonely **0**. No **1**. Yes	☐

SECTION G. INFORMAL SUPPORT SERVICES

1	TWO KEY INFORMAL HELPERS Primary (A) and Secondary (B)	NAME OF PRIMARY AND SECONDARY HELPERS		
		a. (Last/Family Name) b. (First Name)		
		c. (Last/Family Name) d. (First Name)		
			(A) Pri	(B) Sec
		e. Lives with client **0**. Yes **1**. No **2**. No such helper (skip other items in the appropriate column)	☐	☐
		f. Relationship to client **0**. Child or child-in-law **1**. Spouse **2**. Other relative or whanau **3**. Friend/neighbour	☐	☐
		Areas of help: **0**. Yes **1**. No		
		g. Advice or emotional support	☐	☐
		h. IADL care	☐	☐
		i. ADL care	☐	☐
		If needed, willingness (with ability) to increase help: **0**. More than 2 hours per day **1**. 1–2 hours per day **2**. No		
		j. Emotional support	☐	☐
		k. IADL care	☐	☐
		l. ADL care	☐	☐
2	CAREGIVER STATUS	***(Check all that apply)***		
		A caregiver is unable to continue in caring activities—e.g. decline in the health of the caregiver makes it difficult to continue		a. ☐
		Primary caregiver is not satisfied with support received from family and friends (e.g. other children of client)		b. ☐
		Primary caregiver expresses feelings of distress, anger or depression		c. ☐
		NONE OF ABOVE		d. ☐

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3	EXTENT OF INFORMAL HELP (HOURS OF CARE, ROUNDED)	For instrumental and personal activities of daily living received over the **LAST 7 DAYS**, indicate extent of help from family, friends, and neighbours	**HOURS**
		a. Sum of time across five weekdays	☐☐☐
		b. Sum of time across two weekend days	☐☐☐

SECTION H. PHYSICAL FUNCTIONING:
- **IADL PERFORMANCE IN 7 DAYS**
- **ADL PERFORMANCE IN 3 DAYS**

1 IADL SELF-PERFORMANCE—Code for functioning in routine activities around the home or in the community during the **LAST 7 DAYS.**

(A) IADL SELF-PERFORMANCE CODE
(Code for client's performance during LAST 7 DAYS)
0. *INDEPENDENT*—did on own
1. *SOME HELP*—help some of the time
2. *FULL HELP*—performed with help all of the time
3. *BY OTHERS*—performed by others
8. *ACTIVITY DID NOT OCCUR*

(B) IADL DIFFICULTY CODE How difficult it is (or would it be) for client to do activity on own **0**. *NO DIFFICULTY* **1**. *SOME DIFFICULTY*—e.g. needs some help, is very slow, or fatigues **2**. *GREAT DIFFICULTY*—e.g. little or no involvement in the activity is possible	**(A)** Performance	**(B)** Difficulty
a. **MEAL PREPARATION**—How meals are prepared (e.g. planning meals, cooking, assembling ingredients, setting out food and utensils)	☐	☐
b. **ORDINARY HOUSEWORK**—How ordinary work around the house is performed (e.g. doing dishes, dusting, making bed, tidying up, laundry)	☐	☐
c. **MANAGING FINANCES**—How bills are paid, cheque book is balanced, household expenses are balanced	☐	☐
d. **MANAGING MEDICATIONS**—How medications are managed (e.g. remembering to take medicines, opening bottles, taking correct drug dosages, giving injections, applying ointments)	☐	☐
e. **PHONE USE**—How telephone calls are made or received (with assistive devices such as large numbers on telephone, amplification as needed)	☐	☐
f. **SHOPPING**—How shopping is performed for food and household items (e.g. selecting items, managing money)	☐	☐
g. **TRANSPORTATION**—How client travels by vehicle (e.g. gets to places beyond walking distance)	☐	☐

2 ADL SELF-PERFORMANCE—The following address the client's physical functioning in routine personal activities of daily life, for example, dressing, eating, etc. during the **LAST 3 DAYS, considering all episodes of these activities.** For clients who performed an activity independently, be sure to determine and record whether others encouraged the activity or were present to supervise or oversee the activity **(Note—For bathing, code for most dependent single episode in LAST 7 DAYS.)**
0. *INDEPENDENT*—No help, setup, or oversight—OR—Help, setup, oversight provided only 1 or 2 times (with any task or subtask)
1. *SETUP HELP ONLY*—Article or device provided within reach of client 3 or more times
2. *SUPERVISION*—Oversight, encouragement or cueing provided 3 or more times during last 3 days—OR—Supervision (1 or more times) plus physical assistance provided only 1 or 2 times (for a total of 3 or more episodes of help or supervision)
3. *LIMITED ASSISTANCE*—Client highly involved in activity; received physical help in guided manoeuvring of limbs or other non-weight bearing assistance 3 or more times —OR— Combination of non-weight bearing help with more help provided only 1 or 2 times during period (for a total of 3 or more episodes of physical help)
4. *EXTENSIVE ASSISTANCE*—Client performed part of activity on own (50% or more of subtasks), but help of following type(s) were provided 3 or more times:
— Weight-bearing support—OR—
— Full performance by another during part (but not all) of last 3 days
5. *MAXIMAL ASSISTANCE*—Client involved and completed less than 50% of subtasks on own (includes 2+ person assist), received weight bearing help or full performance of certain subtasks 3 or more times
6. *TOTAL DEPENDENCE*—Full performance of activity by another
8. *ACTIVITY DID NOT OCCUR* (regardless of ability)

a. **MOBILITY IN BED**—Including moving to and from lying position, turning side to side, and positioning body while in bed.	☐
b. **TRANSFER**—Including moving to and between surfaces—to/from bed, chair, wheelchair, standing position. (Note—Excludes to/from bath/toilet)	☐
c. **MOBILITY IN HOME**—(Note—If in wheelchair, self-sufficiency once in chair.)	☐
d. **MOBILITY OUTSIDE OF HOME**—(Note—If in wheelchair, self-sufficiency once in chair.)	☐
e. **DRESSING UPPER BODY**—How client dresses and undresses **(street clothes, underwear)** above the waist, includes prostheses, orthotics, fasteners, pullovers, etc.	☐
f. **DRESSING LOWER BODY**—How client dresses and undresses **(street clothes, underwear)** from the waist down, includes prostheses, orthotics, belts, pants, skirts, shoes, and fasteners.	☐
g. **EATING**—Including taking in food by any method, including tube feedings.	☐
h. **TOILET USE**—Including using the toilet room or commode, bedpan, urinal, transferring on/off toilet, cleaning self after toilet use or incontinent episode, changing pad, managing any special devices required (ostomy or catheter), and adjusting clothes.	☐
i. **PERSONAL HYGIENE**—Including combing hair, brushing teeth, shaving, applying makeup, washing/drying face and hands (EXCLUDE baths and showers).	☐
j. **BATHING**—How client takes full-body bath/shower or sponge bath (**EXCLUDE** washing of back and hair). Includes how each part of body is bathed: arms, upper and lower legs, chest abdomen, perineal area. **Code for most dependent episode in LAST 7 DAYS.**	☐

3	ADL DECLINE	ADL status has become worse (i.e. now more impaired in self-performance) as compared to status **90 days ago** (or since last assessment if less than 90 days) **0**. No **1**. Yes	☐

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4	PRIMARY MODES OF MOBILITY	**0**. No assistive device **4**. Wheelchair **1**. Stick **8**. ACTIVITY DID NOT OCCUR **2**. Walker/crutch **3**. Mobility Scooter	
		a. Indoors	☐
		b. Outdoors	☐
5	STAIR CLIMBING	In the **last 3 days**, how client went up and down stairs (e.g. single or multiple steps, using handrail as needed). **0**. Up and down stairs without help **1**. Up and down stairs with help **2**. Not go up and down stairs	☐
6	STAMINA	a. In a typical week, during the **LAST 30 DAYS** (or since last assessment), code the number of days client usually went out of the house or building in which client lives (no matter how short a time period) **0**. Every day **2**. 1 day a week **1**. 2-6 days a week **3**. No days	☐
		b. Hours of physical activities in the last 3 days (e.g. walking, cleaning house, exercise) **0**. Two or more hours **1**. Less than two hours	☐
7	FUNCTIONAL POTENTIAL	***(Check all that apply)***	
		Client believes he/she capable of increased functional independence (ADL, IADL, mobility)	a.
		Caregivers believe client is capable of increased functional independence (ADL, IADL, mobility)	b.
		Good prospects of recovery from current disease or conditions, improved health status expected	c.
		NONE OF ABOVE	d.

SECTION I. CONTINENCE IN LAST 7 DAYS

1	BLADDER CONTINENCE	a. In **LAST 7 DAYS** (or since last assessment if less than 7 days) control of urinary bladder function (with appliances such as catheters or incontinence programme employed) (Note—if dribbles, volume insufficient to soak through underpants) **0**. *CONTINENT*—Complete control; DOES NOT USE any type of catheter or other urinary collection device **1**. *CONTINENT WITH CATHETER*—Complete control with use of any type of catheter or urinary collection device that does not leak urine **2**. *USUALLY CONTINENT*—Incontinent episodes once a week or less **3**. *OCCASIONALLY INCONTINENT*—Incontinent episodes 2 or more times a week but not daily **4**. *FREQUENTLY INCONTINENT*—Tends to be incontinent daily, but some control present **5**. *INCONTINENT*—Inadequate control, multiple daily episodes **8**. *DID NOT OCCUR*—No urine output from bladder	☐
		b. Worsening of bladder incontinence as compared to status **90 days ago** (or since last assessment if less than 90 days) **0**. No **1**. Yes	☐
2	BLADDER DEVICES	(**Check all that apply in LAST 7 DAYS**—or since last assessment if less than 7 days)	
		Use of pads or briefs to protect against wetness	a.
		Use of an indwelling urinary catheter	b.
		NONE OF ABOVE	c.

3	BOWEL CONTINENCE	In **LAST 7 DAYS** (or since last assessment if less than 7 days), control of bowel movement (with appliance or bowel continence programme if employed) **0**. *CONTINENT*—Complete control; DOES NOT USE ostomy device **1**. *CONTINENT WITH OSTOMY*—Complete control with use of ostomy device that does not leak stool **2**. *USUALLY CONTINENT*—Bowel incontinent episodes less than weekly **3**. *OCCASIONALLY INCONTINENT*—Bowel incontinent episodes once a week **4**. *FREQUENTLY INCONTINENT*—Bowel incontinent episodes 2–3 times a week **5**. *INCONTINENT*—Bowel incontinent all (or almost all) of the time **8**. *DID NOT OCCUR*—No bowel movement during entire 7 day assessment period	☐

SECTION J. DISEASE DIAGNOSES

1	DISEASES	Disease/infection that doctor has indicated is present and affects client's status, requires treatment, or symptom management. Also include if disease is monitored by a home care professional or is the reason for a hospitalization in LAST 90 DAYS (or since last assessment if less than 90 days). (**blank**) Not present **1**. Present—not subject to focused treatment or monitoring by home care professional **2**. Present—monitored or treated by home care professional (If no disease in list, check **J1ac**, *None of Above*)			
		HEART/CIRCULATION		**SENSES**	
		a. Cerebrovascular accident (stroke)	☐	q. Cataract	☐
		b. Congestive heart failure	☐	r. Glaucoma	☐
		c. Coronary artery disease	☐	**PSYCHIATRIC/MOOD**	
		d. Hypertension	☐	s. Any psychiatric diagnosis	☐
		e. Irregularly Irregular pulse	☐	**INFECTIONS**	
		f. Peripheral vascular disease	☐	t. HIV infection	☐
		NEUROLOGICAL		u. Pneumonia	☐
		g. Alzheimer's	☐	v. Tuberculosis	☐
		h. Dementia other than Alzheimer's disease	☐	w. Urinary tract infection (**in LAST 30 DAYS**)	☐
		i. Head trauma	☐	**OTHER DISEASES**	
		j. Hemiplegia/ hemiparesis	☐	x. Cancer (in past 5 years) not including skin cancer	☐
		k. Multiple sclerosis	☐	y. Diabetes	☐
		l. Parkinsonism	☐	z. Emphysema/ COPD/ asthma	☐
		MUSCULO-SKELETAL		aa. Renal Failure	☐
		m. Arthritis	☐	ab. Thyroid disease (hyper or hypo)	☐
		n. Hip fracture	☐		
		o. Other fractures (e.g. wrist, vertebral)	☐	ac. *NONE OF ABOVE*	☐
		p. Osteoporosis	☐		

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2	OTHER CURRENT OR MORE DETAILED DIAGNOSES AND ICD-10-CA CODES	a.	
		b.	
		c.	
		d.	

SECTION K. HEALTH CONDITIONS AND PREVENTIVE HEALTH MEASURES

1	PREVENTIVE HEALTH (PAST TWO YEARS)	**(Check all that apply—in PAST 2 YEARS)**				
		Blood pressure measured	a.	IF FEMALE: Received breast examination or mammography	d.	
		Received influenza vaccination	b.			
		Test for blood in stool or screening endoscopy	c.	*NONE OF ABOVE*	e.	
2	PROBLEM CONDITIONS PRESENT ON 2 OR MORE DAYS	**(Check all that were present on at least 2 of the last 3 days)**				
		Diarrhoea	a.	Loss of appetite	d.	
		Difficulty urinating or urinating 3 or more times at night	b.	Vomiting	e.	
				NONE OF ABOVE	f.	
		Fever	c.			
3	PROBLEM CONDITIONS	**(Check all present at any point during last 3 days)**				
		PHYSICAL HEALTH		**MENTAL HEALTH**		
		Chest pain/pressure at rest or on exertion	a.	Delusions	f.	
				Hallucinations	g.	
		No bowel movement in 3 days	b.	*NONE OF ABOVE*	h.	
		Dizziness or lightheadedness	c.			
		Oedema	d.			
		Shortness of breath	e.			
4	PAIN	a. Frequency with which client complains or shows evidence of pain **0**. No pain (score b–e as 0) **1**. Less than daily **2**. Daily—one period **3**. Daily—multiple periods (e.g. morning and evening)				
		b. Intensity of pain **0**. No pain **1**. Mild **2**. Moderate **3**. Severe **4**. Times when pain is horrible or excruciating				
		c. From client's point of view, pain intensity disrupts usual activities **0**. No **1**. Yes				
		d. Character of pain **0**. No pain **1**. Localized—single site **2**. Multiple sites				
		e. From client's point of view, medications adequately control pain **0**. Yes or no pain **1**. Medications do not adequately control pain **2**. Pain present, medication not taken				
5	FALLS FREQUENCY	Number of times fell in **LAST 90 DAYS** (or since last assessment if less than 90 days). If none, code "**0**", if more than 9, code "**9**".				
6	DANGER OF FALL	**(Code for danger of falling)** **0**. No **1**. Yes				
		a. Unsteady gait				
		b. Client limits going outdoors due to fear of falling (e.g. stopped using bus, goes out only with others)				
7	LIFESTYLE (Drinking/ Smoking)	**(Code for drinking or smoking)** **0**. No **1**. Yes				
		a. **In the LAST 90 DAYS** (or since last assessment if less than 90 days), client felt the need or was told by others to cut down on drinking, or others were concerned with client's drinking				
		b. **In the LAST 90 DAYS** (or since last assessment if less than 90 days), client had to have a drink first thing in the morning to steady nerves (i.e. an "eye opener") or has been in trouble because of drinking				
		c. Smoked or chewed tobacco daily				
8	HEALTH STATUS INDICATORS	**(Check all that apply)**				
		Client feels he/she is poor health (when asked)	a.	Treatments changed in **LAST 30 DAYS** (or since last assessment if less than 30 days) because of a new acute episode or condition	d.	
		Has conditions or diseases that make cognition, ADL, mood, or behaviour patterns unstable (fluctuations, precarious, or deteriorating)	b.	Prognosis of less than six months to live—e.g.	e.	
		Experiencing a flare-up of a recurrent or chronic problem	c.	Physician/GP has told client or client's family that client has end-stage disease		
				NONE OF ABOVE	f.	
9	OTHER STATUS INDICATORS	**(Check all that apply)**				
		Fearful of a family member or caregiver	a.	Physically restrained (e.g. limbs restrained, used bed rails, constrained to chair when sitting)	e.	
		Unusually poor hygiene	b.			
		Unexplained injuries, broken bones, or burns	c.	*NONE OF ABOVE*	f.	
		Neglected, abused, or mistreated	d.			

SECTION L. NUTRITION/HYDRATION STATUS

1	WEIGHT	**(Code for weight items)** **0**. No **1**. Yes	
		a. Unintended weight loss of 5% or more in the **LAST 30 DAYS** (or 10% or more in the **LAST 180 DAYS**)	
		b. Severe malnutrition (cachexia)	
		c. Morbid obesity	
2	CONSUMPTION	**(Code for consumption)** **0**. No **1**. Yes	
		a. In at least 2 of the last 3 days, ate one or fewer meals a day	
		b. **In last 3 days**, noticeable decrease in the amount of food client usually eats or fluids usually consumes	
		c. Insufficient fluid—did not consume all/almost all fluids during last 3 days	
		d. Enteral tube feeding	

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3	SWALLOWING	**0**. *NORMAL*—Safe and efficient swallowing of all diet consistencies **1**. *REQUIRES DIET MODIFICATION TO SWALLOW SOLID FOODS* (mechanical diet or able to ingest specific foods only) **2**. *REQUIRES MODIFICATION TO SWALLOW SOLID FOODS AND LIQUIDS* (puree, thickened liquids) **3**. *COMBINED ORAL AND TUBE FEEDING* **4**. *NO ORAL INTAKE (NPO)*	

SECTION M. DENTAL STATUS (ORAL HEALTH)

1	ORAL STATUS	**(Check all that apply)**	
		Problem chewing (e.g. poor mastication, immobile jaw, surgical resection, decreased sensation/motor control, pain while eating)	a.
		Mouth is "dry" when eating a meal	b.
		Problem brushing teeth or dentures	c.
		NONE OF ABOVE	d.

SECTION N. SKIN CONDITION

1	SKIN PROBLEMS	Any trouble skin conditions or changes in skin condition (e.g. burns, bruises, rashes, itchiness, body lice, scabies) **0**. No **1**. Yes	
2	ULCERS (Pressure/ Stasis)	Presence of an ulcer anywhere on the body. Ulcers include any area of persistent skin redness (Stage 1); partial loss of skin layers (Stage 2); deep craters in the skin (Stage 3); breaks in skin exposing muscle or bone (Stage 4). [**Code 0 if no ulcer, otherwise record the highest ulcer stage (Stage 1–4).**]	
		a. **Pressure ulcer**—any lesion caused by pressure, shear forces, resulting in damage of underlying tissues	
		b. **Stasis ulcer**—open lesion caused by poor circulation in the lower extremities	
3	OTHER SKIN PROBLEMS REQUIRING TREATMENT	**(Check all that apply)**	
		Burns (second or third degree)	a.
		Open lesions other than ulcers, rashes, cuts (e.g. cancer)	b.
		Skin tears or cuts	c.
		Surgical wound	d.
		Corns, calluses, structural problems, infections, fungi	e.
		NONE OF ABOVE	f.
4	HISTORY OF RESOLVED PRESSURE ULCERS	Client previously had (at any time) or has an ulcer anywhere on the body. **0**. No **1**. Yes	
5	WOUND/ ULCER CARE	**(Check for formal care in LAST 7 DAYS)**	
		Antibiotics, systemic or topical	a.
		Dressings	b.
		Surgical wound care	c.
		Other wound/ulcer care (e.g. pressure relieving device, nutrition, turning, debridement)	d.
		NONE OF ABOVE	e.

SECTION O. ENVIRONMENTAL ASSESSMENT

1	HOME ENVIRONMENT	**[Check any of following that make home environment hazardous or uninhabitable (if none apply, check NONE OF ABOVE, if temporarily in institution, base assessment on home visit)]**	
		Lighting in evening (including inadequate or no lighting in living room, sleeping room, kitchen, toilet, corridors)	a.
		Flooring and carpeting (e.g. holes in floor, electric wires where client walks, mats/rugs)	b.
		Bathroom and toilet room (e.g. non-operating toilet, leaking pipes, no rails though needed, slippery bathtub, outside toilet)	c.
		Kitchen (e.g. dangerous stove, inoperative refrigerator, infestation by rats or bugs)	d.
		Heating and cooling (e.g. too hot in summer, too cold in winter, wood burner/stove in a home with an asthmatic)	e.
		Personal safety (e.g. fear of violence, safety problem in going to mail/letter box or visiting neighbours, heavy traffic in street)	f.
		Access to home (e.g. difficulty entering/leaving home)	g.
		Access to rooms in house (e.g. unable to climb stairs)	h.
		NONE OF ABOVE	i.
2	LIVING ARRANGEMENT	a. As compared to 90 DAYS AGO (or since last assessment), client now lives with other persons—e.g. moved in with another person, other moved in with client **0**. No **1**. Yes	
		b. Client or primary caregiver feels that client would be better off in another living environment **0**. No **1**. Client only **2**. Caregiver only **3**. Client and caregiver	

SECTION P. SERVICE UTILIZATION (IN LAST 7 DAYS)

1	FORMAL CARE (Minutes rounded to even 10 minutes)	Extent of care or care management in **LAST 7 DAYS** (or since last assessment if less than 7 days) since involving			
		#of:	**(A) Days**	**(B) Hours**	**(C) Mins**
		a. Personal care/support services			
		b. Visiting nurses			
		c. Household management services			
		d. Meals			
		e. Volunteer services			
		f. Physiotherapy			
		g. Occupational therapy			
		h. Speech & Lang therapy			
		i. Day care or day hospital			
		j. Social worker			

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2	SPECIAL TREATMENTS, THERAPIES, PROGRAMMES	Special treatments, therapies, and programmes received or scheduled during the **LAST 7 DAYS** (or since last assessment if less than 7 days) and adherence to the required schedule. Includes services received in the home or on an outpatient basis. (**Blank**) Not applicable **1**. Scheduled, full adherence as prescribed **2**. Scheduled, partial adherence **3**. Scheduled, not received (If no treatments provided, check *NONE OF ABOVE* **P2aa**)	

RESPIRATORY TREATMENTS		**THERAPIES**	
a. Oxygen	☐	n. Exercise therapy	☐
b. Respirator for assistive breathing	☐	o. Occupational therapy	☐
c. All other respiratory treatments	☐	p. Physiotherapy	☐
OTHER TREATMENTS		**PROGRAMMES**	
d. Alcohol/drug treatment programme	☐	q. Day centre	☐
		r. Day hospital	☐
e. Blood transfusion(s)	☐	s. Hospice care	☐
f. Chemotherapy	☐	t. Physician/GP or clinic visit	☐
g. Dialysis	☐	u. Respite care	☐
h. IV infusion—central	☐	**SPECIAL PROCEDURES DONE IN HOME**	
i. IV infusion—peripheral	☐	v. Daily nurse monitoring (e.g. ECG, urinary output)	☐
j. Medication by injection	☐		
k. Ostomy care	☐	w. Nurse monitoring less than daily	☐
l. Radiation	☐	x. Medical alert bracelet or electronic security alert	☐
m. Tracheostomy care	☐	y. Skin treatment	☐
		z. Special diet	☐
		aa. *NONE OF ABOVE*	☐

3	MANAGEMENT OF EQUIPMENT (**In Last 3 Days**)	**Management codes:** **0**. Not used **1**. Managed on own **2**. Managed on own if laid out or with verbal reminders **3**. Partially performed by others **4**. Fully performed by others	
		a. Oxygen	☐
		b. IV	☐
		c. Catheter	☐
		d. Ostomy	☐
4	VISITS IN LAST 90 DAYS OR SINCE LAST ASSESSMENT	**Enter "0" if none, if more than 9, code "9"**	
		a. Number of times ADMITTED TO HOSPITAL **with** an overnight stay	☐
		b. Number of times VISITED EMERGENCY ROOM **without** an overnight stay	☐
		c. EMERGENT CARE—including unscheduled nursing, Physician/GP, or therapeutic visits to office or home	☐

5	TREATMENT GOALS	Any treatment goals that have been met in the **LAST 90 DAYS** (or since last assessment if less than 90 days)? **0**. No **1**. Yes	☐
6	OVERALL CHANGE IN CARE NEEDS	Overall self-sufficiency has changed significantly as compared to status of **90 DAYS AGO** (or since last assessment if less than 90 days) **0**. No change **1**. Improved—receives fewer supports **2**. Deteriorated—receives more support	☐
7	TRADE OFFS	Because of limited funds, during the last month, client made trade-offs among purchasing any of the following: prescribed medications, sufficient home heat, necessary Physician/GP care, adequate food, home care **0**. No **1**. Yes	☐

SECTION Q. MEDICATIONS

1	NUMBER OF MEDICATIONS	Record the number of different medicines (prescriptions and over the counter), including eye drops, taken regularly or on an occasional basis in the **LAST 7 DAYS** (or since last assessment) *(If none, code "**0**", if more than 9, code "**9**".)*	☐
2	RECEIPT OF PSYCHOTROPIC MEDICATION	Psychotropic medications taken in the **LAST 7 DAYS** (or since last assessment) [Note—Review client's medications with the list that applies to the following categories.] **0**. No **1**. Yes	
		a. Antipsychotic/neuroleptic	☐
		b. Anxiolytic	☐
		c. Antidepressant	☐
		d. Hypnotic	☐
3	MEDICAL OVERSIGHT	Physician/GP reviewed client's medications as a whole in **LAST 180 DAYS** (or since last assessment) **0**. Discussed with at least one Physician/GP (or no medication taken) **1**. No single Physician/GP reviewed all medications	☐
4	COMPLIANCE/ ADHERENCE WITH MEDICATIONS	Compliant all or most of time with **medications** prescribed by Physician/GP (both during and between therapy visits) in **LAST 7 DAYS** **0**. Always compliant **1**. Compliant 80% of time or more **2**. Compliant less than 80% of time, including failure to purchase prescribed medications **3**. *NO MEDICATIONS PRESCRIBED*	☐

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Q5 LIST OF ALL MEDICATIONS

List prescribed and nonprescribed medications taken in **LAST 7 DAYS** (or since last assessment)

a. **Medication Name and Dose**: name (generic or trade names are both acceptable) of the medication, as well as the dose ordered

b. **Number Taken**: the amount of medication administered each time the medication is given. Number taken is not always the dose. Rather, it is the number of tablets, capsules, suppositories, or amount of liquid (cc's, mls, units) per dose that is administered to the resident

c. **Form**: Code the route of Administration using the following list:

1. By mouth (PO)
2. Sub lingual (SL)
3. Intramuscular (IM)
4. Intravenous (IV)
5. Subcutaneous (SQ)
6. Rectal (R)
7. Topical
8. Inhalation
9. Enteral tube
10. Other

d. **Frequency**: Code the number of times per day, week, or month the medication is administered using the following list:

PRN As necessary
Q6 H Every six hours
QH Every hour
Q8H Every eight hours
Q2H Every two hours
QD Once daily
Q3 H Every three hours
HS Bedtime
Q4 H Every four hours
BID Two times daily (includes every 12 hours)
TID Three times daily
2W Two times every week
1M Once every month
QID Four times daily
3W Three times every week
2M Twice every month
5D Five times daily
4W Four times every week
C Continuous
QOD Every other day
5W Five times every week
O Other
QW Once each week
6W Six times every week

e. **If PRN**: record number of doses taken in last 7 days.

	a. Medication Name and Dose	b. Number Taken	c. Form	d. Frequency	e. If PRN: # doses
a					
b					
c					
d					
e					
f					
g					
h					
i					
j					
k					
l					
m					
n					
o					
p					
q					
r					
s					
t					
u					
v					
w					
x					
y					
z					
aa					
bb					
cc					
dd					

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SECTION R. ASSESSMENT INFORMATION				
1	SIGNATURES OF PERSONS COMPLETING THE ASSESSMENT			
	a. Signature of Assessment Coordinator			
	b. Title of Assessment Coordinator			
	c. Date Assessment Coordinator signed as complete ☐☐ Day ☐☐ Month ☐☐☐☐ Year			
	Other Signatures	Title	Sections	Date

Appendix C: Recoding of items on the interRAI-HC version 9.1 and the MDS-HC version 2.0 forms

interRAI-HC 9.1	MDS-HC 2.0	Item Title
A11	**AA4**	Domicile Code: Domicile Code of usual living arrangement
A12	**CC5**	HC1 RESIDENTIAL STATUS: Residential /Living status at time of assessment
A13a	**CC6**	HC1 LIVING ARRANGEMENT lives: a. Lives
A13b	**O2a**	HC1 LIVING ARRANGEMENT 90 days change: b. As compared to 90 DAYS AGO (or since last assessment), person now lives with someone new
A13c	**O2b**	HC1 LIVING ARRANGEMENT better off elsewhere: c. Person or relative feels that the person would be better off living elsewhere
A14	**CC4**	HC1 TIME SINCE LAST HOSPITAL STAY: Code for most recent instance in LAST 90 DAYS
A1d	**A1d**	HC1 NAME OF CLIENT Jr Sr: d. Jr/Sr
A2	**BB1**	HC1 SEX:
A3	**BB2a**	HC1 BIRTH DATE:
A4	**BB4**	HC1 MARITAL STATUS:
A5a	**AA2**	NUMERIC IDENTIFIERS A5a: a. National Health Identifier (NHI) number
A5c	**AA3**	ACC Claim Number: c. ACC claim number
A7a	**BB7a**	HC1 PAYMENT CATEGORIES a: a. New Zealand resident / citizen
A7b	**BB7b**	HC1 PAYMENT CATEGORIES b: b. Work Visa
A7c	**BB7c**	HC1 PAYMENT CATEGORIES c: c. Australian resident in NZ
A7d	**BB7d**	HC1 PAYMENT CATEGORIES d: d. UK or Australian citizen visiting NZ
A7e	**BB7e**	HC1 PAYMENT CATEGORIES e: e. ACC accepted claims
A8	**A2**	HC1 REASON FOR ASSESSMENT: Primary reason for assessment
A9	**A1**	HC1 ASSESSMENT REFERENCE DATE:
B1	**CC1**	HC1 DATE CASE OPENED:
B2a	**BB3ba**	ETHNICITY: 10 European not further defined
B2b	**BB3bb**	ETHNICITY: 11 New Zealand European
B2c	**BB3bc**	ETHNICITY: 12 Other European
B2d	**BB3bd**	ETHNICITY: 21 Maori
B2e	**BB3be**	ETHNICITY: 30 Pacific peoples not further defined
B2f	**BB3bf**	ETHNICITY: 31 Samoan
B2g	**BB3bg**	ETHNICITY: 32 Cook Island Maori
B2h	**BB3bh**	ETHNICITY: 33 Tongan
B2i	**BB3bi**	ETHNICITY: 34 Niuean
B2j	**BB3bj**	ETHNICITY: 35 Tokelauan
B2k	**BB3bk**	ETHNICITY: 36 Fijian
B2l	**BB3bl**	ETHNICITY: 37 Other Pacific peoples
B2m	**BB3bm**	ETHNICITY: 40 Asian not further defined
B2n	**BB3bn**	ETHNICITY: 41 Southeast Asian
B2o	**BB3bo**	ETHNICITY: 42 Chinese
B2p	**BB3bp**	ETHNICITY: 43 Indian

B2q	**BB3bq**	ETHNICITY: 44 Other Asian
B2r	**BB3br**	ETHNICITY: 51 Middle Eastern
B2s	**BB3bs**	ETHNICITY: 52 Latin American / Hispanic
B2t	**BB3bt**	ETHNICITY: 53 African (or any group of African origin)
B2u	**BB3bu**	ETHNICITY: 61 Other ethnicity
B2y	**BB3bv**	ETHNICITY: 99 Not stated
B3	**BB5a**	Primary language: Primary language (See manual for codes)
B4a		HC1 RESIDENTIAL HISTORY OVER LAST 5 YEARS Long-term care facility: a. Long-term care facility—e.g., nursing home
C1	**B2a**	HC1 COGNITIVE SKILLS FOR DAILY DECISION MAKING: Making decisions regarding tasks of daily life—e.g., when to get up or have meals, which clothes to
C2a	**B1a**	MEMORY RECALL ABILITY a: a. Short-term memory OK—Seems / appears to recall after 5 minutes
C2b	**B1b**	MEMORY RECALL ABILITY b: b. Procedural memory OK—Can perform all or almost all steps in a multitask sequence without cues
C2c		MEMORY RECALL ABILITY c: c. Situational memory OK—Both: recognises caregivers' names / faces frequently encountered AND knows
C5	**B2b**	CHANGE IN DECISION MAKING:
D1	**C2**	HC1 MAKING SELF UNDERSTOOD: Expressing information content—both verbal and non-verbal
D2	**C3**	HC1 ABILITY TO UNDERSTAND OTHERS : Understanding verbal information content (however able; with hearing aid normally used)
D3	**C1**	HC1 HEARING: Ability to hear (with hearing aid normally used)
D4	**D1**	HC1 VISION: Ability to see in adequate light (with glasses or with other visual aid normally used)
E1a	**E1a**	HC1 INDICATORS OF DEPRESSION a: a. Made negative statements—e.g., "Nothing matters"; "Would rather be dead"; "What's the use"; "Re
E1b	**E1b**	HC1 INDICATORS OF DEPRESSION b: b. Persistent anger with self or others—e.g., easily annoyed, anger at care received
E1c	**E1c**	HC1 INDICATORS OF DEPRESSION c: c. Expressions, including nonverbal, of what appear to be unrealistic fears—e.g., fear of being ab
E1d	**E1d**	HC1 INDICATORS OF DEPRESSION d: d. Repetitive health complaints—e.g., persistently seeks medical attention, incessant concern with
E1e	**E1e**	HC1 INDICATORS OF DEPRESSION e: e. Repetitive anxious complaints / concerns (non-health-related) e.g., persistently seeks attention
E1f	**E1f**	HC1 INDICATORS OF DEPRESSION f: f. Sad, pained, or worried facial expressions—e.g., furrowed brow, constant frowning
E1g	**E1g**	HC1 INDICATORS OF DEPRESSION g: g. Crying, tearfulness
E1h		HC1 INDICATORS OF DEPRESSION h: h. Recurrent statements that something terrible is about to happen—e.g., believes he or she is about to die
E1i	**E1h**	HC1 INDICATORS OF DEPRESSION i: i. Withdrawal from activities of interest—e.g., long-standing activities, being with family / friend
E1j	**E1i**	HC1 INDICATORS OF DEPRESSION j: j. Reduced social interactions
E3a	**E3a**	HC1 BEHAVIOUR SYMPTOMS a: a. Wandering—Moved with no rational purpose, seemingly oblivious to needs or safety

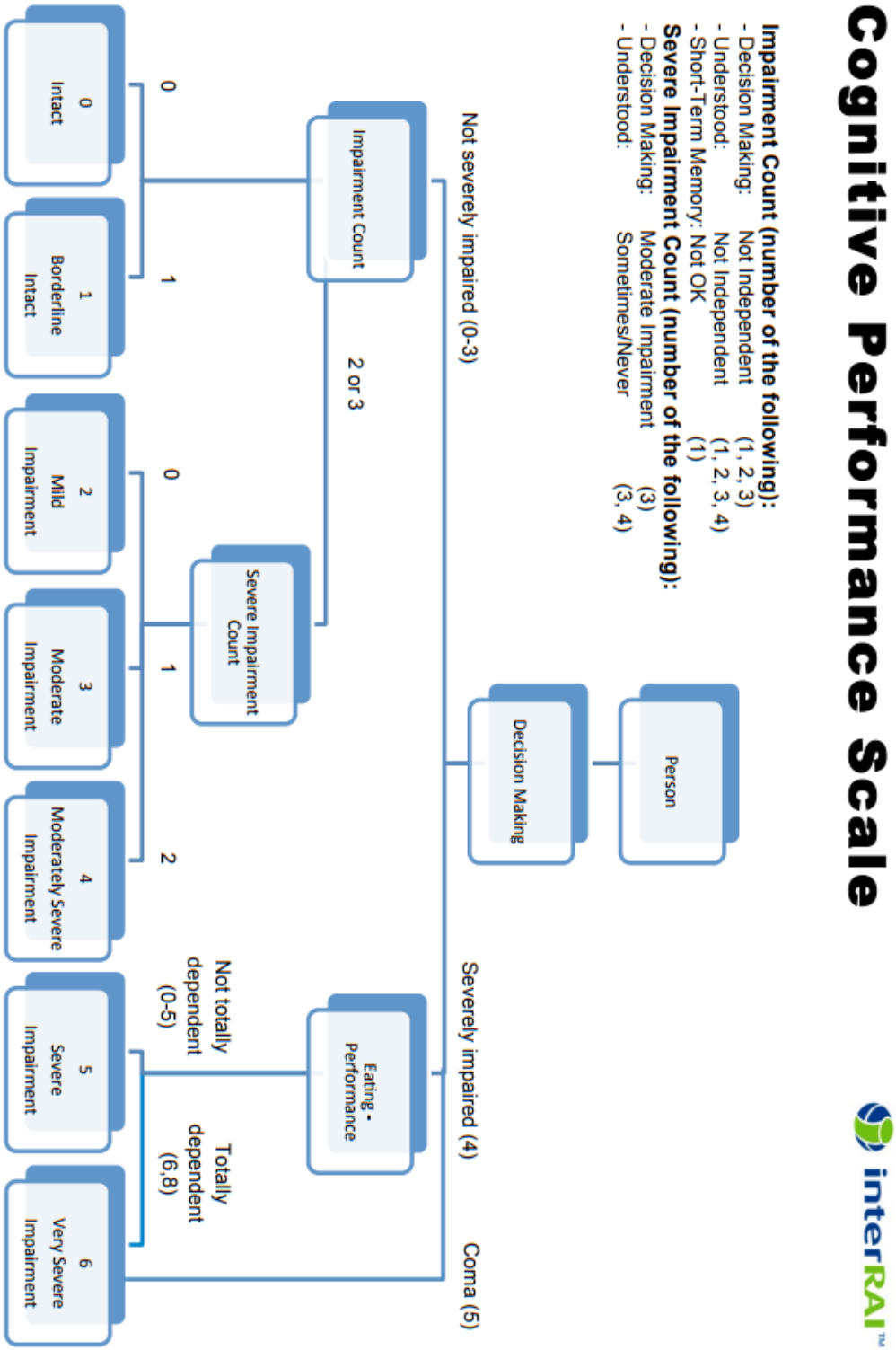
E3b	**E3b**	HC1 BEHAVIOUR SYMPTOMS b: b. Verbal abuse—e.g., others were threatened, screamed at, cursed at
E3c	**E3c**	HC1 BEHAVIOUR SYMPTOMS c: c. Physical abuse—e.g., others were hit, shoved, scratched, sexually abused
E3d	**E3d**	HC1 BEHAVIOUR SYMPTOMS d: d. Socially inappropriate or disruptive behaviour — e.g., made disruptive sounds or noises, screamed
E3f	**E3e**	HC1 BEHAVIOUR SYMPTOMS f: f. Resists care—e.g., taking medications / injections, ADL assistance, eating
F1d	**F1b**	HC1 SOCIAL RELATIONSHIPS d: d. Conflict or anger with family or friends
F1f		HC1 SOCIAL RELATIONSHIPS f: f. Neglected, abused, or mistreated
F2	**F3b**	HC1 LONELY: Says or indicates that he / she feels lonely
F3	**F2**	HC1 CHANGE IN SOCIAL ACTIVITIES: Decline in level of participation in social, religious, occupational, or other preferred activities.
F4	**F3a**	HC1 LENGTH OF TIME ALONE: (MORNING AND AFTERNOON)
G1aa	**H1aA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY aa: Meal Preparation a. Performance
G1ab	**H1aB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY ab: Meal Preparation b. Capacity
G1ba	**H1bA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY ba: Ordinary Housework a. Performance
G1bb	**H1bB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY bb: Ordinary Housework b. Capacity
G1ca	**H1cA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY ca: Managing Finances a. Performance
G1cb	**H1cB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY cb: Managing Finances b. Capacity
G1da	**H1dA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY da: Managing Medications a. Performance
G1db	**H1dB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY db: Managing Medications b. Capacity
G1ea	**H1eA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY ea: Phone Use a. Performance
G1eb	**H1eB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY eb: Phone Use b. Capacity
G1fa	**H5**	HC1 IADL SELF-PERFORMANCE AND CAPACITY fa: Stairs a. Performance
G1fb	**H5**	HC1 IADL SELF-PERFORMANCE AND CAPACITY fb: Stairs b. Capacity
G1ga	**H1fA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY ga: Shopping a. Performance
G1gb	**H1fB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY gb: Shopping b. Capacity
G1ha	**H1gA**	HC1 IADL SELF-PERFORMANCE AND CAPACITY ha: Transportation a. Performance
G1hb	**H1gB**	HC1 IADL SELF-PERFORMANCE AND CAPACITY hb: Transportation b. Capacity
G2a	**H2j**	HC1 ADL SELF-PERFORMANCE a: a. Bathing—How takes a full-body bath / shower. Includes how transfers in and out of bath or shower
G2b	**H2i**	HC1 ADL SELF-PERFORMANCE b: b. Personal hygiene—How manages personal hygiene, including combing hair, brushing teeth, shaving, a
G2c	**H2e**	HC1 ADL SELF-PERFORMANCE c: c. Dressing upper body—How dresses and undresses (street clothes, underwear) above the waist
G2d	**H2f**	HC1 ADL SELF-PERFORMANCE d: d. Dressing lower body—How dresses and undresses (street clothes, underwear) from the waist down, in
G2h	**H2h**	HC1 ADL SELF-PERFORMANCE h: h. Toilet use—How uses the toilet room (or commode, bedpan, urinal), cleanses self after toilet use

G2i	**H2a**	HC1 ADL SELF-PERFORMANCE i: i. Bed mobility—How moves to and from lying position, turns from side to side, and positions body
G2j	**H2g**	HC1 ADL SELF-PERFORMANCE j: j. Eating—How eats and drinks (regardless of skill). Includes intake of nourishment by other means (
G4a	**H6b**	HC1 ACTIVITY LEVEL a: a. Total hours of exercise or physical activity in LAST 3 DAYS—e.g., walking
G4b	**H6a**	HC1 ACTIVITY LEVEL b: b. In the LAST 3 DAYS, number of days went out of the house or building in which he / she resides (
G5a	**H7a**	HC1 PHYSICAL FUNCTION IMPROVEMENT POTENTIAL a: a. Person believes he / she is capable of improved performance in physical function
G6	**H3**	Change in ADL status (0-3): As compared to 90 days ago, or since last assessment if less than 90 days ago
H1	**I1a**	HC1 BLADDER CONTINENCE:
H2	**I2b**	HC1 URINARY COLLECTION DEVICE: (Exclude pads / briefs)
H3	**I3**	HC1 BOWEL CONTINENCE:
H4	**I2a**	HC1 PADS OR BRIEFS WORN:
I1a	**J1n**	HC1 DISEASE DIAGNOSES a: a. Hip fracture during last 30 days (or since last assessment if less than 30 days)
I1b	**J1o**	HC1 DISEASE DIAGNOSES b: b. Other fracture during last 30 days (or since last assessment if less than 30 days)
I1c	**J1g**	HC1 DISEASE DIAGNOSES c: c. Alzheimer's disease
I1d	**J1h**	HC1 DISEASE DIAGNOSES d: d. Dementia other than Alzheimer's disease
I1e	**J1j**	HC1 DISEASE DIAGNOSES e: e. Hemiplegia
I1f	**J1k**	HC1 DISEASE DIAGNOSES f: f. Multiple sclerosis
I1h	**J1l**	HC1 DISEASE DIAGNOSES h: h. Parkinson's disease
I1j	**J1a**	HC1 DISEASE DIAGNOSES j: j. Stroke / CVA
I1k	**J1c**	HC1 DISEASE DIAGNOSES k: k. Coronary heart disease
I1l	**J1z**	HC1 DISEASE DIAGNOSES l: l. Chronic obstructive pulmonary disease
I1m	**J1b**	HC1 DISEASE DIAGNOSES m: m. Congestive heart failure
I1r	**J1u**	HC1 DISEASE DIAGNOSES r: r. Pneumonia
I1s	**J1w**	HC1 DISEASE DIAGNOSES s: s. Urinary tract infection in last 30 days
I1t	**J1x**	HC1 DISEASE DIAGNOSES t: t. Cancer
I1u	**J1y**	HC1 DISEASE DIAGNOSES u: u. Diabetes mellitus
J1	**K5**	HC1 FALLS:
J6a	**K4a**	HC1 PAIN SYMPTOMS a: a. Frequency with which person complains or shows evidence of pain (including grimacing, teeth cle
J6b	**K4b**	HC1 PAIN SYMPTOMS b: b. Intensity of highest level of pain present
J7a	**K8b**	HC1 INSTABILITY OF CONDITIONS a: a. Conditions / diseases make cognitive, ADL, mood, or behaviour patterns unstable (fluctuating, pre
J7b	**K8c**	HC1 INSTABILITY OF CONDITIONS b: b. Experiencing an acute episode, or a flare-up of a recurrent or chronic problem
J8	**K8d**	HC1 SELF-REPORTED HEALTH: Ask: "In general, how would you rate your health?"
K3	**L3**	HC1 MODE OF NUTRITIONAL INTAKE:
K4c	**M1a**	HC1 DENTAL OR ORAL c: c. Reports having dry mouth
K4d	**M1b**	HC1 DENTAL OR ORAL d: d. Reports difficulty chewing

L1	**N2a**	HC1 MOST SEVERE PRESSURE ULCER:
L2	**N4**	HC1 PRIOR PRESSURE ULCER:
L3	**N2b**	HC1 PRESENCE OF SKIN ULCER OTHER THAN PRESSURE ULCER: e.g., venous ulcer, arterial ulcer, mixed venous-arterial ulcer, diabetic foot ulcer
L4	**N1**	HC1 MAJOR SKIN PROBLEMS: e.g., lesions, 2nd- or 3rd-degree burns, healing surgical wound
L5	**N3c**	HC1 SKIN TEARS OR CUTS: Other than surgery
L6	**N3a**	HC1 OTHER SKIN CONDITIONS OR CHANGES IN SKIN CONDITION: e.g., bruises, rashes, itching, mottling, herpes zoster, intertrigo, eczema
M3	**Q4**	HC1 ADHERENT WITH MEDICATIONS PRESCRIBED BY PHYSICIAN:
N2a	**P2f**	HC1 TREATMENTS AND PROGRAMS a:
N2b	**P2g**	HC1 TREATMENTS AND PROGRAMS b:
N2e	**P2a**	HC1 TREATMENTS AND PROGRAMS e:
N2f	**P2l**	HC1 TREATMENTS AND PROGRAMS f:
N2i	**P2e**	HC1 TREATMENTS AND PROGRAMS i:
N2j	**P2b**	HC1 TREATMENTS AND PROGRAMS j:
N2m	**CC3f**	HC1 TREATMENTS AND PROGRAMS m:
N4a	**P4a**	HC1 HOSPITAL USE a: a. Inpatient acute care hospital with overnight stay
N4b	**P4b**	HC1 HOSPITAL USE b: b. Emergency room visit (not counting overnight stay)
N4c	**P4c**	HC1 HOSPITAL USE c: c. Physician visit (or authorized assistant or practitioner)
O1a	**BB6a**	HC1 LEGAL GUARDIAN a: a. EPOA for personal care and welfare
O1b	**BB6a**	HC1 LEGAL GUARDIAN b: b. EPOA for property
O2a	**BB6b**	HC1 ADVANCE DIRECTIVES a: a. Living will
O2b	**BB6b**	HC1 ADVANCE DIRECTIVES b: b. Do not resuscitate
O2c	**BB6b**	HC1 ADVANCE DIRECTIVES c: c. Do not hospitalise
O2d	**BB6b**	HC1 ADVANCE DIRECTIVES d: d. Organ donation
O2e	**BB6b**	HC1 ADVANCE DIRECTIVES e: e. Post mortem request
O2f	**BB6b**	HC1 ADVANCE DIRECTIVES f: f. Feeding restrictions
O2g	**BB6b**	HC1 ADVANCE DIRECTIVES g: g. Medication restrictions
O2h	**BB6b**	HC1 ADVANCE DIRECTIVES h: h. Other treatment restrictions
P1a1	**G1fA**	HC1 INFORMAL HELPERS 1a: a. Relationship to person
P1a2	**G1fB**	HC1 INFORMAL HELPERS 2a: a. Relationship to person
P1b1	**G1gA**	HC1 INFORMAL HELPERS 1b: b. Lives with person
P1b2	**G1gB**	HC1 INFORMAL HELPERS 2b: b. Lives with person
P1c1	**G1hA**	HC1 INFORMAL HELPERS 1c: c. IADL help
P1c2	**G1hB**	HC1 INFORMAL HELPERS 2c: c. IADL help
P1d1	**G1iA**	HC1 INFORMAL HELPERS 1d: d. ADL help
P1d2	**G1iB**	HC1 INFORMAL HELPERS 1d: d. ADL help
P2a	**G2a**	HC1 INFORMAL HELPER STATUS a: a. Informal helper(s) is unable to continue in caring activities—e.g., decline in health of helper m
P2b	**G2c**	HC1 INFORMAL HELPER STATUS b: b. Primary informal helper expresses feelings of distress, anger, or depression
P2c	**G2b**	HC1 INFORMAL HELPER STATUS c: c. Family or close friends report feeling overwhelmed by person’s illness

P3	**G3a**	HC1 HOURS OF INFORMAL CARE: For instrumental and personal activities of daily living in the LAST 3 DAYS, indicate the total numb
Q1c	**O1e**	HC1 HOME ENVIRONMENT c: c. Inadequate heating or cooling—e.g., too hot in summer, too cold in winter
Q1d	**O1f**	HC1 HOME ENVIRONMENT d: d. Lack of personal safety—e.g., fear of violence, safety problem in going to mailbox or visiting ne
Q1e	**O1g**	HC1 HOME ENVIRONMENT e: e. Limited access to home or rooms in home—e.g., difficulty entering or leaving home, unable to clim
R1	**P5**	HC1 ONE OR MORE CARE GOALS MET:
R2	**P6**	HC1 SELF-SUFFICIENCY HAS CHANGED SIGNIFICANTLY:

Appendix D: Interpretation of the Cognitive Performance Scale (interRAI-HC, 2014; http://www.interrai.org/assets/files/Scales/cognitive-performance-scale-2014.pdf)



Source: Morris JN, Fries BE, Mehr DR, Hawes C, Philips C, Mor V, Lipsitz L. (1994) MDS Cognitive Performance Scale. Journal of Gerontology: Medical Sciences 49 (4): M174-M182.

Appendix E: Interpretation of the Instrumental Activities of Daily Living Performance Scale (interRAI, http://www.interrai.org/assets/files/Scales/IADL%20Performance.pdf)

IADL Performance Scale

Score	IADLS
0–6	Meal preparation
0–6	Ordinary housework
0–6	Managing finances
0–6	Managing medications
0–6	Phone use
0–6	Stairs
0–6	Shopping
0–6	Transportation

Range: 0–48

Scoring in self-performance:

0 = Independent — No help, setup, or supervision

1 = Setup help only

2 = Supervision — Oversight/cuing

3 = Limited assistance — Help on some occasions

4 = Extensive assistance — Help throughout task, but performs 50% of task on own

5 = Maximal assistance — Help throughout task, but performs less than 50% of task on own

6 = Total dependence — Full performance by others during entire period

8 = Activity did not occur during entire period, Score = 6

Appendix F: Interpretation of the Depression Rating Scale (interRAI, 2015; http://www.interrai.org/assets/files/Scales/cognitive-performance-scale-2014.pdf)

Depression Rating Scale (DRS)

Score	Item
0-3	Made negative statements
0-3	Persistent anger with self or others
0-3	Expressions (including non-verbal) of what appear to be unrealistic fears
0-3	Repetitive health complaints
0-3	Repetitive anxious complaints/concerns (non-health related)
0-3	Sad, pained, worried facial expression
0-3	Crying, tearfulness

Range: 0-14

Scoring:

0 = No mood symptoms

14 = All mood symptoms present in last 3 days

Scores of 3 or greater indicate major or minor depressive disorders.

The Depression Rating Scale (DRS) is calculated by summing all seven input items after recoding each input item to a three-point (0, 1, 2) scale. For each input item, above, the first two levels, 0 and 1, are not recoded; level 2 is recoded to 1; and level 3 is recoded to 2.

Source: Burrows A, Morris JN, Simon S, Hirdes JP, Phillips C. (2000) Development of a Minimum Data Set-based Depression Rating Scale for Use in Nursing Homes. Age and Ageing 29(2): 165-172.